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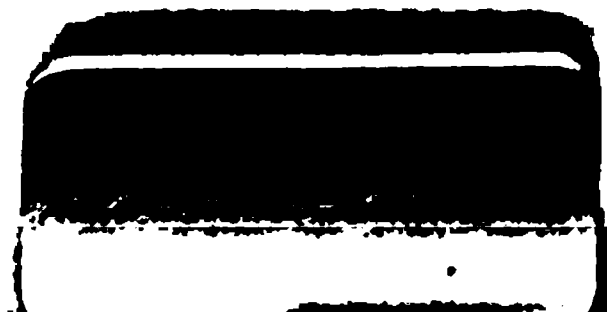
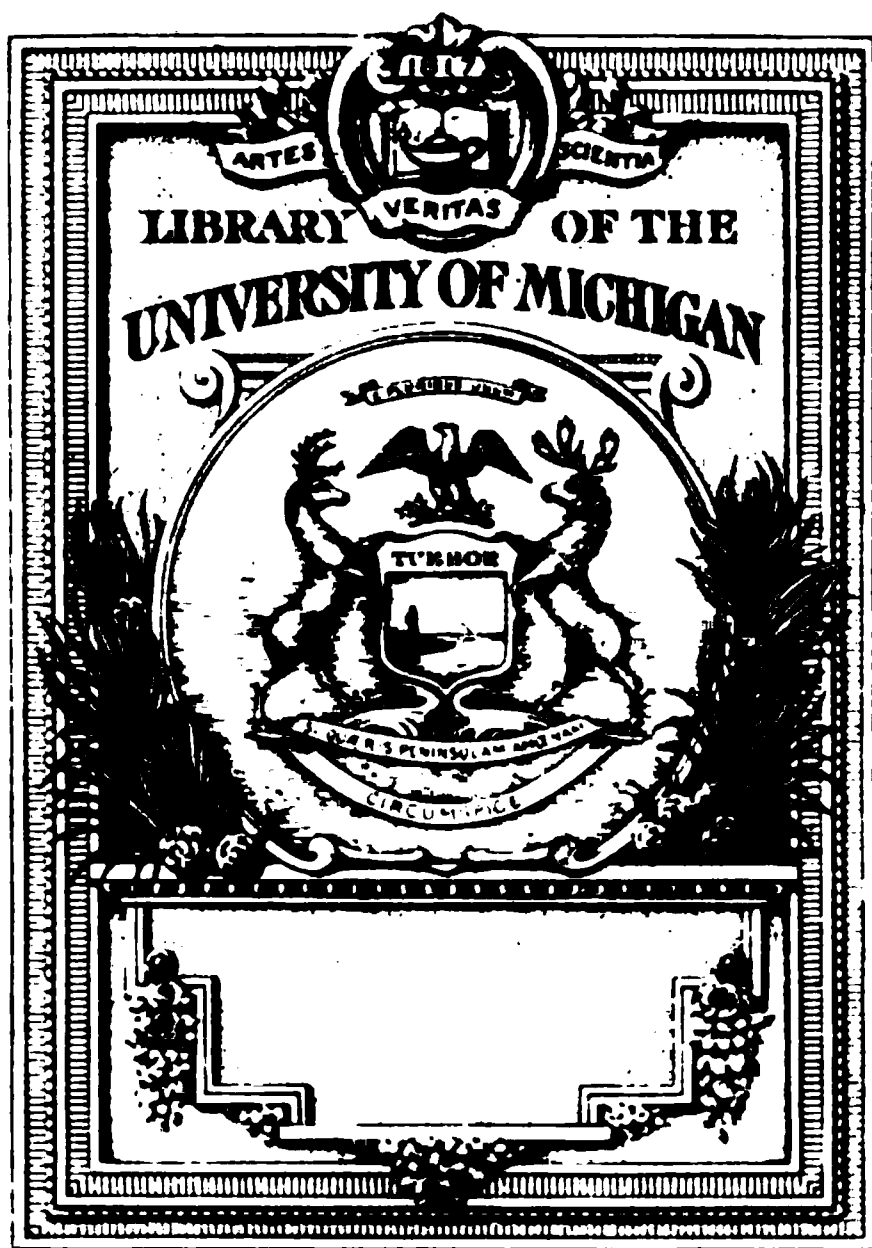
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DOCUMENTS

OF THE

ASSEMBLY OF THE STATE OF NEW YORK.

ONE HUNDRED AND EIGHTH SESSION,

1885.

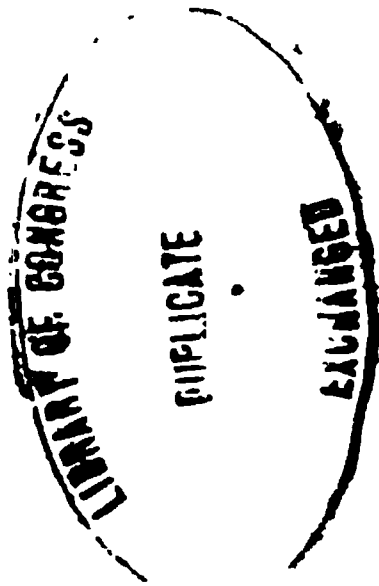
VOLUME IV.—Nos. 33 to 42, inclusive.

ALBANY:

WEED, PARSONS AND COMPANY, LEGISLATIVE PRINTERS.

1885.

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THIRD ANNUAL REPORT

OF THE

BOARD OF CONTROL

OF THE

New York Agricultural Experiment Station,

For the Year 1884,

WITH THE REPORTS OF THE DIRECTOR AND OFFICERS.

TRANSMITTED TO THE LEGISLATURE JANUARY 21, 1885:

ALBANY, N. Y.:
WEED, PARSONS AND COMPANY.
LEGISLATIVE PRINTERS.
1885.

1884.

ORGANIZATION OF THE STATION.

BOARD OF CONTROL.

GOVERNOR CLEVELAND, ALBANY, N. Y.
ROBERT J. SWAN, PRESIDENT, GENEVA, Ontario Co., N. Y.
GEN. N. M. CURTIS, SEC., OGDENSE'G, St. Lawrence Co., N. Y.
PATRICK BARRY, ROCHESTER, Monroe Co., N. Y.
W. A. ARMSTRONG, ELMIRA, Chemung Co., N. Y.
JAMES McCANN, ELMIRA, Chemung Co., N. Y.
JOHN O'DONNELL, JAMAICA, Queens Co., N. Y.
DANIEL BATCHELOR, UTICA, Oneida Co., N. Y.
J. S. WOODWARD, LOCKPORT, Niagara Co., N. Y.
A. V. MEKEEL, NORTH HECTOR, Schuyler Co., N. Y.

Director.

E. LEWIS STURTEVANT, A. M., M. D.

Assistant.

C. S. PLUMB, B. S.

Horticulturist.

EMMETT S. GOFF.

Assistant.

O. E. LISS.

Botanist.

J. C. ARTHUR, M. S.

Chemist.

S. MOULTON BABCOCK, A. M. Ph. D.

Assistant.

E. F. LADD, B. S.

Stenographer.

F. E. NEWTON

Farmer.

G. W. CHURCHILL.

NEW YORK STATE EXPERIMENT STATION.

AN Act establishing an Agricultural Experiment Station, passed June 26, 1880, as amended by the Act passed August 15, 1881.

SECTION 1. For the purpose of promoting agriculture in its various branches by scientific investigation and experiment, an institution is hereby established to be called and known as the New York Agricultural Experiment Station.

§ 2. The management of this institution shall be committed to a board of trustees, to be known as the Board of Control of the State Experiment Station. Robert J. Swan, William A. Armstrong, N. Martin Curtis, Stephen W. Clark, Patrick Barry, Robert J. Dodge, Jabez S. Woodward, Daniel Batchelor and James McCann shall be the first trustees of the institution, of whom the three first named shall hold office as such trustees for three years, the three next named for two years, and the three last named for one year from the first day of January, eighteen hundred and eighty-one. Whenever a vacancy shall occur in such board by expiration of the term of office of any member thereof, or otherwise, the same shall be filled by the governor, and all trustees so appointed by the governor shall hold office for the term of three years, and until others be appointed in their stead. The governor shall be a member of the board by virtue of his office.

§ 3. The said board of control shall annually elect a president from their own number, and shall appoint a secretary and a treasurer to hold such offices during the pleasure of the board. Six members of the board shall be a quorum for the transaction of business.

[Sections 4 and 5 of the original act are repealed.]

§ 6. Said board of control shall locate and have the general management of the station and shall appoint a director to have the general oversight and management of the experiments and investigations which shall be necessary to accomplish the objects of said institution, and may employ competent and suitable chemists and other persons necessary to the carrying on of the work of the station. Said board may acquire, by lease or otherwise, such real estate as may in their judgment be necessary for carrying on the work, and shall have the direction of the expenditure of all money appropriated to the institution for the purposes aforesaid, or otherwise received therefor, and shall annually make a full report to the legislature of their proceedings, receipts and expenditures. All property acquired by the said board shall belong to the state and shall be disposed of and used only as authorized by law.

§ 7. The sum of twenty thousand dollars annually is hereby appropriated to said New York Agricultural Experiment Station for two years, out of any money in the treasury not otherwise appropriated, which shall be paid to the treasurer of said board of control, at such time and in such sums as said board may require, upon the order of the comptroller of the state, who is hereby directed to draw his order for the same on the treasurer of the state. And the treasurer of said board of control shall be required, before entering upon the duties of his office, to give bond with surety to the treasurer of the state in the sum of ten thousand dollars, for the faithful discharge of his duties as such treasurer.

§ 8. Every member of said board may, by a vote thereof, be paid his necessary traveling expenses, as well as those incurred by him while in actual attendance upon the meetings of the said board; but no member shall receive as such any other remuneration for his services in attendance on the meetings of the board.

§ 9. Said Board of Control shall make such rules and regulations as may from time to time become necessary to carry out the objects of the station.

§ 10. This act shall take effect from its passage.

STATE OF NEW YORK.

No. 33.

IN ASSEMBLY,

JANUARY 21, 1885.

REPORT

OF THE BOARD OF CONTROL OF THE NEW YORK AGRICULTURAL EXPERIMENT STATION.

To the Honorable, the Legislature of the State of New York :

The work of the station in the past year has exceeded in tangible results that of any like period in the past. Experiments instituted at the beginning have been pursued with greater advantage, because difficulties that appeared at the outset have been eliminated, in part at least, and facilities for attaining specific objects have been increased.

It is well understood by those who have practical acquaintance with agricultural experiments that the value of the work depends in large measure upon its exactness, and it is, therefore, necessary, in conducting these experiments to successful issue that observers should be trained to habits of precise observation, uninfluenced by any purpose except the one object, to arrive at the truth. Hence the greater value of work performed in the last year by the corps of trained assistants under the management of a director who has himself developed increased capacity for the special labors assigned.

That investigations pursued with minute care in the various branches of labor at the station may be duly appreciated by farmers generally, it is necessary that they have understanding regarding the character of the work, and particularly that they take account of time required to reach safe conclusions. They must recognize the fact that results of a single experiment in any line of investigation cannot be accepted as conclusive, because there are many varying conditions liable in any repetition of the work to change results materially ; hence, the necessity of repeating from year to year until these conditions have been duly measured and their effects noted. It is only after such repetition of experiments conducted with exact nicety of management and observation that the results for which the whole work of the station is planned can approach that definiteness

of conclusion necessary to bring the full measure of usefulness contemplated by the director and confidently expected by intelligent observers who have noted the progress of work during the last three years.

In the report of the director, herewith submitted, embracing reports of his assistants, may be found complete records of work for the year, together with statements of results so far as attained. Examination will show that a great amount of labor has been expended, and it may be assumed that practical gains already made are of such value that they will be regarded by all who are interested in the work as at least partial justification for outlays of money required by the work which cannot be fully productive until carried to completion. Thus, there are numerous experiments intended to test the value of seeds - their vitality and fruitfulness. Other experiments in various methods of cultivation, and still others in feeding milch cows, already beginning to have practical value. We believe that in farther progress of work there will be important truths developed applicable to ordinary farming in the various branches in which experiments are pursued; and we deem it, therefore, a matter of great importance that the principal labors of the Station be conducted in accordance with the plans outlined in previous reports and observed during the past year.

With the purpose of conveying practical lessons in field culture to farmers who visit the Station, portions of the farm in the past year have been devoted to ordinary crops, the system of tillage intended to be applicable in general farming. While the work of the year has been but a beginning, it is the design of the board of control, fully accepted by the director, that increasing attention to this kind of work shall be given, not on greater areas of land, but rather on portions of the farm not immediately required for the more definite and special experimental work.

As the result of labors in the past year in general farming, excellent crops were gathered, particularly of wheat and corn, which will bring in their sale some offset to the money expended in experimental work. It is not expected, however, that returns from this source will be more than enough to provide for conducting general farm labors successfully, together with some little surplus for branches of experimental work that may be added with special reference to the instruction of farmers who visit the Station.

During the year a farm cottage has been erected, a provision very much needed in the past. Other improvements on various portions of the farm have been made, including provision for cranberry culture on a small scale to test the capabilities of production on farms where the conditions are similar.

We append the report of the director, to which reference is made for more complete information regarding the character and extent of the work conducted during the year.

Respectfully submitted,

ROBERT J. SWAN,

N. M. CURTIS, *Secretary.*

President.

TREASURER'S REPORT.

GENEVA, N. Y., *January 20, 1885.*

To the Honorable the Legislature of the State of New York:

As treasurer of the board of control of the New York Agricultural Experiment Station, I have received for the eleven months ending with September 30, 1884, checks from the Treasurer of the State of New York, amounting to \$19,592. I have expended during the eleven months ending with September 30, 1884, \$17,214.79, vouchers for which, duly audited by the special auditing committee of the board of control, have been furnished the Comptroller of the State of New York.

Properly classified, the expenditures have been as follows:

Permanent improvements.....	\$1,330 25
Labor.....	4,361 77
Salaries	6,991 50
Live stock.....	400 00
Running expenses, including seeds, stable supplies, coal, oil, postage, express, freight, printing, station- ery, stakes, labels, etc.....	4,131 27
	<hr/>
	\$17,214 79

There has also been expended by the Comptroller, for traveling expenses of the board of control, to Sep- tember 30, 1884.....	408 00
	<hr/>

Making total expenses for the eleven months . . . \$17,622 79

To meet the requirements of the Comptroller, the fiscal year has been calculated to September 30, and our accounts, therefore, show only the expenditures during the eleven months preceding. The expendi- ture for the year ending October 31, the date used in the previous reports, was.....	\$18,689 76 408 00
	<hr/>
	\$19,097 76

ROBERT J. SWAN,
Treasurer.

REPORT OF THE DIRECTOR.

To the Board of Control of the New York Agricultural Experiment Station :

GENTLEMEN — I herewith present my third annual report, embracing the period included in the year 1884.

An examination of the various subjects reported upon will indicate the variety and direction of our investigations. The reports of the assistants are deserving of attention, as embracing much that is of more than permanent interest. The horticulturist's report offers data which, in connection with last year's report, will serve to indicate the necessity of continuous work in order to eliminate the effect of season upon earliness, and the experiments therein given will tend to throw light upon certain obscure causes of variation which appear in practice. The botanist's report deals principally with fungus troubles, and some of the results gained are of importance as clearing the way for future investigation. The chemist's report embraces not only records of analyses made, but much careful work upon the churning of milk, a subject of great importance to our dairymen and which will receive in the future a greater attention, as we have at last succeeded in obtaining duplicate results in churning, which will enable us, hereafter, to advance future experiments by having a check ever present upon our work. The work in the laboratory has increased so much as to require additional assistance, which we have now had for three months, and yet we are much behind in analyses which have been requested by the public. The report from the laboratory will be found to contain much material for future use, and which it would be unwise to discuss until our work has extended over a longer period. The report of the assistant deals with cereals, a most difficult subject, and one in which full success can scarcely be expected until after several seasons' observations and study. In an appendix, complete daily data are given of our thermometer readings, both for 1883 and 1884, for the air and soil, and these in the future will be found of great assistance in our efforts to interpret the separate provinces and values of the various factors which united control our agriculture.

I must repeat in this report what I gave in my last, concerning the staff. Each member has given willing and industrious service, and the spirit of helpfulness, even in matters without their province,

has been active and most commendable. This spirit of harmony and interest is deserving of record, as adding so much to the efficiency of our work. Some changes have occurred during the year Mr. Wing resigned his position, as first assistant, in June, and C. S. Plumb, a graduate of the Massachusetts Agricultural College, was secured as his successor; Mr. Watson, our stenographer, left January 1 and his place has been filled by F. E. Newton; Mr. Lovett resigned in September; O. E. Liess came in the spring as a student, and has been given the duties of an assistant, which he has faithfully fulfilled; E. F. Ladd, a graduate of the Maine Agricultural College, came as a student October 1, and on December 1 was appointed assistant chemist. Mr. G. W. Churchill was engaged as a farmer last winter, and has performed his duties faithfully and intelligently, relieving the director of all cares as to the detail work of his department.

The duties of an agricultural experiment station, as your director interprets them, combines science with practice. The most careful scientific work is required for the establishing of principles and the interpretation of laws, and accurate practical work for verifying the conclusions gained and for suggesting applications. The great want of the agriculture of to-day is the establishment of principles which shall serve as a safe guide for reasoning, and it is only as one's views offered as prophecy is submitted to the test of close observation by the aid of the scales, the foot-rule and the measure, that the deficiency of our present knowledge in the very essentials of our work becomes manifest. It is with the intention of exhibiting the fallacy of some very universal beliefs, that I have devoted some space to the examination of "duplicates," for it is evident that when true duplicates cannot be obtained, it is unwise to expend our energy in attempting work over which we can have no check. To attempt plat-work, until we have means of determining whether our results are in accord with our reasoning, or until we can purposely secure duplicates, is very apt to lead to the establishment of erroneous belief, and to thus work an injury not only in the present, but as preventive to progress. Until we can obtain closer duplicates than we have yet secured, we can do no better than to confine ourselves to interpretation in terms of greater or less, rather than in terms of exact bushels or pounds. Indeed, until agricultural science, so called, can be subjected to the tests that are recognized as essential to correctness in other sciences, we cannot hope for that progress which we desire. Fortunately, there is reason to believe that a more careful study into agricultural problems will lead us toward the period when we can give value to the various factors which influence crop production, and thus be able to secure duplicate conditions and duplicate results, through the reducing of apparent variability to uniformity, through the logical application of corrections which shall be justified by a more exact knowledge than we now possess. These results, however, cannot be expected of the plat

system, so called, unless this plat system be interpreted in accordance with scientifically settled principles, which must first be ascertained and valued.

The trial of germinations, as published, must be considered as a portion of the study into the value of figures obtained in their relation to duplicates. We have in this trial exact conditions of exposure of seeds counted from the same package. It is evident that we cannot at present interpret the result of an ordinary germination percentage any more closely than these results indicate, as variability occurs in nearly every case, and the limits are not as yet exactly defined. It will be noticed that, as in lettuce seed the variation between duplicates averages about four per cent, and the possible variation may be even much more, between any two samples which differ in the germination but four per cent, we cannot justly say that one sample is better than the other. This figure varies also with different species of vegetables, and hence each must be studied by itself. A variation, which may be called mathematical, also occurs, and must be considered. If we have but ten seeds under trial, the germination result can only be expressed as 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 per cent, or not within the ten units; if twenty-five seeds be used, we can express our results only by differences of 4; if fifty seeds be used, only by differences of two; if 100 seeds, by differences of one. Thus to compare two samples — ten seeds of one and 100 seeds of the other — we have not real duplicates, for this factor of number constitutes a difference. It is probable that for each series of duplicate germinations there is a certain number which should be used as a unit, as in general the differences between duplicates diminish in proportion to the number of seed used, but the determination of this number must be the subject of experiment, and must be discussed in part under the law of probability before we can obtain a constant for use. In such a simple matter, apparently, as germination trials, we have evidence of the need of careful and exact knowledge. We are required, for perfectness of results, to know the value of changing as compared to even temperature, of the influence of the stage of ripeness of the seed, of methods of gathering and keeping, of the place of growth, etc., etc. These points are, however, only referred to here for the sake of illustration.

The subject of nomenclature is a very important one, and it is surprising that so much has been already accomplished by the public without the advantages which an exact nomenclature offers. There is scarcely any work we can do toward furthering progress that is of greater promise than this. So long as two distant investigators cannot be sure that they are experimenting upon the same kind of plant, their results cannot be strictly comparable. Even professional botanists have not recognized the importance of variety as a factor in their experiments. It is unquestionable but that there is a variety difference between vegetables of the same species, that results calculated for the Dwarf Golden Pop Corn, for instance, which grows

normally but eighteen inches tall, and ripens its two-inch ears in August, may not apply to the Caragua corn, which grows normally fourteen feet tall and ripens its nine-inch ears in October, and yet Sachs and other German physiological botanists offer the results of their trials with *Zea Mays*, not mentioning variety, a species which varies within extreme limits, and which offers at least 300 varieties, and probably more, which can be recognized and described. The nomenclature of our field cereals is in great confusion. Some years ago I collected samples of King Philip Corn, one of the most easily recognized varieties, from nine different sources, and received under the name King Philip what might have been described as seven distinct kinds. We have attempted the nomenclature of maize in this report, and the whole value of the attempt, if successful, must be ascribed to the detail experiments which precede, and which furnish the principles which must be used in order to separate and define. Just so fast as we obtain diagnostic points in our vegetables, may we hope to succeed in our attempts at close identification.

Our attempt at classification has been extended to all our varieties of vegetables, of which some 1,200 have been grown, but the work is a difficult one and requires much careful study. We must await the results of another year, and perhaps longer, before we attain even approximate completeness. The system outlined in part in last year's report receives additional confirmation as to its value in our this year's work. There is no theoretical reason why our garden and field products should not be capable of being identified by description, and that agricultural botany should not vie in its power for identification with natural botany. If we once recognize that man's wants are reasonably stable, and that there consequently exists in the vegetables formed through his selective art a great fixity of form, we are encouraged to classificatory work.

We would call especial attention to our observations upon the rooting habits of plants as found in the horticulturist's report. It is only as we ascertain the position in the soil of the plant roots that we have a rational interpretation offered to explain the action of fertilizers. The fertilizing deeply for shallow-rooting plants, or shallow for deep-rooting plants, may explain cases where fertilizer appears to have none or but little efficacy, as it is certainly plausible to believe that good crops respond to good soil within the area where the roots feed.

Allied to this question of fertilizer is that of nitrogen supply. It is now proven beyond reasonable doubt that nitrification is the result of the action of an organized ferment, which occurs abundantly in soils and in most impure waters. This nitrification is strictly limited to the range of temperature within which the vital activity of the organisms is confined, proceeding with extreme slowness near the freezing point and increasing in activity with a rise in temperature till 98° F. is reached, and then diminishing and ceasing altogether at 131° F. Recent experiments at Rothamstead show that in the absence of phosphates no nitrification will occur. Nitrification seems to occur

in darkness and near the surface of the soil, according to Koch, the process ceasing at about three feet depth. While we have carried out no examinations devoted particularly to this theory, yet our examination of lysimeter water are in the direction of showing the changes in soil nitrogen in the form of ammonia or nitrates which occur from month to month and year to year. The nitrogen of the lower layers of the soil, as carried down by drainage, for it seems not to be found there, is recovered to the farm by deep-rooted plants, of which clover is the chief, and hence the growing of clover serves the double purpose of furnishing crop, and as well as an agency which works to save for us this nitrogen on the way toward waste.

The lysimeter records afford matters of extreme interest, but it is preferable to await a longer record before discussing our results. The amount of rainfall and percolation, and the analysis of the monthly collections are put upon record in the chemist's report. The amount of nitrogen is given in parts per million, thus avoiding the use of long decimals and as "parts per million" are identical with "milligrams per litre," our results are at once comparable with records made on the continent of Europe where the French system of measures is in vogue. We may state here that one inch of water per acre weighs 225,965 lbs., and consequently ten parts per million of nitrogen or any other constituent of rain or drainage water corresponds to 2.26 lbs. per acre for each inch of rain or drainage water.

In our feeding experiments we have endeavored to secure the utmost accuracy compatible with the circumstances. While it is impossible to work in this class of experiments without a quite large margin for error, a margin which does not admit of too slight differences to count for much by themselves, yet we have preferred to offer the figures as recorded. The hygroscopic properties of fodder are such that analyses would show a certain variation in the water content not only in different days, but also in different periods of the same day, and the slight errors in the weighings of the food eaten are also a factor to be considered. In the long run these errors probably balance each other, but as between any two results the differences can only be used within a limit which is as yet undefined for the most part, but in live weight of cows may be accepted as from three to five per cent, as between two adjoining weighings. It is from this point of view that the study of averages assumes importance, as by massing our results and averaging, these variations which we must call accidental tend to become divided and distributed in such a way as to counterbalance the plus and the minus changes.

In our experiments with milk we have acquired results of true value. There is but one method which is safe to use for the determining of the manufacturing properties of milk, and this is the manufacture. The churning of aliquot parts of milk under exactly duplicate conditions gives answer to the question of the value for butter making. Chemical analysis gives the food value of the milk, but does not determine the proportion of butter that can be made

from a given sample. Cream percentage varies under so many different conditions as to afford no indication of the richness in fat, or of the butter quality of any one sample of milk, as compared with another, as this percentage is affected not only by temperatures and time of setting, but as well by the character of the milk used, and has no constant relation to the fat content as determined by analysis. It is possible that the raising of cream by centrifugal force may show some constant relation, at least as between milks of the same class, between the cream and butter percentage, but the trials to prove this point have not been made by us, nor do we find any upon record.

The variability of the fat content of our milk should excite attention. Our results show the uncertainty which must attend the interpretation of the effect of food upon composition of milk unless very frequent analyses accompany each stage of the trial, and that something more must be done than simply analyzing the milk at the beginning and end of an experiment, especially when cows of high quality are the subjects of our trials.

The Station is now better equipped for its work than at any previous period, as we not only have provided the necessary apparatus for scientific and practical work, but we have and are acquiring information regarding the condition of our soil and climate. The work at a station like this is necessarily cumulative in its character, and each year must mark improvement in conditions whereby previous work may become more available. In the separate titles which follow will be found record of work accomplished, with such reflections as the character of the subjects suggest, but we must warn that in the present condition of agricultural experiment much of our work must be tentative in its character, must be at present a subject for record only, and that to draw conclusions in every case as to the final result or teachings would be as unwise as unnecessary. To secure necessary accuracy, every experiment should be repeated and verified either in whole or in some one or more of its parts, before accepted as conclusive.

DONORS AND GIFTS.

During the year we have received the following gifts:

Jan. 2. From S. H. Verplanck, Geneva, N. Y., two samples of wheat from India.

Jan. 7. From Hon. J. W. Wadsworth, M. C., Vol. II, U. S. Census Report, 1880.

Jan. 10. From American Dairy Salt Company, Syracuse, N. Y., five barrels of agricultural salt.

Jan. 11. From Prof. Spencer F. Baird, Washington, D. C., the Smithsonian Report for 1881.

Jan. 16. From Prof. C. W. Dabney, Raleigh, N. C., a collection of ear corn.

Jan. 31. From the Commissioner of Agriculture, Washington, D. C., various pamphlet publications of the Department of Agriculture.

Jan. 31. From J. M. Thorburn & Co., seedsmen, N. Y., the privilege of selection from their stock of seeds, as desired, free of cost.

Feb. 18. From Hiram Sibley & Co., seedsmen, Rochester, N. Y., samples of ear corn and other seeds.

Feb. 20. From George S. Lewis, Springfield, Mass., a collection of ear corn.

March 1. From I. F. Tillinghast, seedsman, La Plume, Pa., samples of cabbage seed of Puget Sound growth.

March 1. From D. Landreth & Sons, seedsmen, Philadelphia, Pa., fifty packets of various vegetable seeds.

March 1. From Messrs. Vilmorin, Andrieux & Cie, Paris, France, 489 large packets of as many varieties of seeds, and the privilege of free selection from their catalogued stock.

March 1. From Messrs. Vilmorin, Andrieux & Cie, Paris, France, one copy of Album de Clichés.

March 4. From D. M. Ferry & Co., seedsmen, Detroit, Mich., a fine collection of ear corn.

March 5. From J. J. H. Gregory, seedsman, Marblehead, Mass., a collection of ear corn.

March 7. From the Commissioner of Agriculture, Washington, D. C., copy of Report of Department of Agriculture for 1883.

March 10. From Mrs. H. M. Lewis, secretary, Transactions of the Wisconsin Horticultural Society for 1883.

March 14. From J. C. Vaughan, seedsman, Chicago, Ill., a fine collection of ear corn.

March 24. From Messrs. Vilmorin, Andrieux & Cie, Paris, France, one copy of Bon Jardinier, 1884.

March 26. From R. Nott, Charlotte, Vt., one new seedling potato.

March 27. From J. Gallup, Ledyard, Ct., samples of ear corn and oats.

April 5. From Hon. E. G. Lapham, U. S. S., five packets of tobacco seed.

April 6. From F. H. Cushing, Zuni, six samples of the corn grown by the Zuni Indians, and six samples of beans.

April 14. From C. W. Garfield, secretary, Report of Michigan Horticultural Society for 1883.

April 15. From D. Batchelor, Utica, N. Y., a package of *Festuca duriuscula* seed.

April 31. From Hon. J. W. Wadsworth, M. C., Vol. III, U. S. Census, 1880.

April 31. From O. H. Alexander, Charlotte, Vt., a number of packets of seed of new vegetables of his origination.

April 23. From Peter Holloway, Monclover, O., some living specimens of wild plants.

April 25. From B. K. Bliss & Sons, seedsmen, New York, N. Y., nine varieties of peas for trial.

April 26. From D. Landreth & Sons, seedsmen, Philadelphia, Pa., four samples of maize from Africa.

April 26. From J. M. Thorburn & Co., seedsmen, New York, N. Y., sixteen quart samples of varieties of corn for planting.

May 1. From Hiram Sibley & Co., seedsmen, Rochester, N. Y., one quart of Soja beans.

May 7. From I. F. Tillinghast, seedsman, La Plume, Pa., two packages of Lee's Favorite potato.

May 15. From E. L. Coy, West Hebron, N. Y., a seedling potato.

May 15. From Hiram Sibley & Co., seedsmen, Rochester, N. Y., a superb assortment of Pansy plants.

May 19. From Hon. J. W. Wadsworth, M. C., Vol. IV, U. S. Census, 1880.

May 27. From D. Landreth & Sons, seedsmen, Philadelphia, Pa., three samples of corn from Senegal.

May 27. From J. T. Henderson, commissioner, one volume of Publications of the Georgia State Department of Agriculture for the year 1883; Vol. IX.

May 27. From Morris Little & Son, Williamsburg, Brooklyn, N. Y., one gallon Little's Soluble Phenyle.

June 16. From J. E. Condon, 49 Cedar street, New York, N. Y., three pounds of Buhach.

June 23. From Prof. W. R. Lazenby, director, Second Annual Report of the Ohio Agricultural Experiment Station for 1883.

July 26. From Buhach Producing and Manufacturing Company, Stockton, Cal., several pounds of Buhach and one cyclone nozzle.

Aug. 18. From Prof. S. F. Baird, Washington, D. C., Smithsonian Report for 1882.

Aug. 18. From Gen. Hazen, Chief Signal Officer, Reports of the Signal Service for 1871, 1872, 1877, 1879, 1880, 1881, in all six volumes.

Aug. 25. From Hon. J. W. Wadsworth, M. C., one copy each of Land Laws of the United States, 1882, vols. 1 and 2; Existing Land Laws, 1880; The Public Domain, 1883.

Aug. 27. From John Bradley, Lyons, N. Y., one package of Finlay wheat.

Sept. 1. From Patterson Bros., Windfall, Ind., five kinds of wheat.

Sept. 1. From Thomas Woodason, Chicago, Ill., one set Woodason bellows, for insect powder and insecticide solution.

Sept. 9. From John Bradley, Lyons, N. Y., samples of Surprise, Finlay and Fultz-Clawson wheat.

Sept. 12. From Prof. W. R. Lazenby, director of the Ohio Agricultural Experiment Station, two quarts each of forty varieties of wheat.

Sept. 12. From W. L. Eastman, Ovid, N. Y., one package each of Landreth and Mediterranean Hybrid wheats.

Sept. 30. From John J. Thompson, Secretary Seed Drill Regulator Company, Lemont, Pa., one set of their Seed Drill Regulators.

Oct. 1. From Silas S. Mitchell, Bath, Me., one paper of Mexican Mammoth Tomato seed.

Oct. 9. From Messrs. Ellwanger & Barry, nurserymen, Rochester N. Y., eighteen varieties of plum trees, twelve varieties of peach trees, one pear tree, and eight varieties of cherry trees.

Oct. 11. From F. Probst, Mendon, N. Y., English walnuts for seed.

Oct. 29. From Hon. J. W. Wadsworth, M. C., vol. VII, and vol. VIII, U. S. Census, 1880.

Nov. 19. From State Board of Health, N. Y., one copy each of 1st, 2d, 3d, and 4th Annual Report.

Nov. 22. From A. Dawson, Mohawk, P. O., Canada, a sample of a new wheat.

Nov. 22. From Duryea Starch Co., Glen Cove, Long Island, fifteen barrels of corn feed or slump.

Dec. 4. From Jos. Harris, seedsman, Rochester, N. Y., pop-corn seed.

Dec. 10. From J. C. Vaughan, seedsman, Chicago, Ill., samples of ear corn.

Dec. 17. From T. L. Harison, Secretary N. Y. State Agr. Society, Transactions of the New York State Agricultural Society, 1877-1882.

BULLETINS.

During the year we have observed the use of our bulletins, No. LXXVI to No. CVI, in the following papers: Those marked with a * publish the bulletins quite regularly.

American Farmer, Baltimore, Md.

American Garden, New York, N. Y.

American Grange Bulletin, Cincinnati, O.

*American Rural Home, Rochester, N. Y.

Buffalo Express, Buffalo, N. Y.

Canadian Horticulturist, St. Catherines, P. O. Canada

Cultivator and Country Gentleman, Albany, N. Y.

Dunkirk Journal, Dunkirk, N. Y.

Farmer, Malone, N. Y.

Farmer and Dairyman, Syracuse, N. Y.

Farmer's Advocate, London, P. O., Canada.

Farmer's Review, Chicago, Ill.

Gardener's Chronicle, London, England.

Gardener's Monthly, Philadelphia, Pa.

*Geneva Advertiser, Geneva, N. Y.

*Geneva Courier, Geneva, N. Y.

*Geneva Gazette, Geneva, N. Y.

*Geneva Miscellany, Geneva, N. Y.

Hearthstone, Farm and Nation, Philadelphia, Pa.

Home Farm, Augusta, Me.

*Husbandman, Elmira, N. Y.

Jamaica Standard, Jamaica, N. Y.

Jamestown Evening Journal, Jamestown, N. Y.

Lebanon Gazette, Lebanon, O.
Maryland Farmer, Baltimore, Md.
Massachusetts Ploughman, Boston, Mass.
New England Farmer, Boston, Mass.
New England Homestead, Springfield, Mass.
News and Courier, Charleston, S. C.
New York Weekly News, New York, N. Y.
New York Weekly Times, New York, N. Y.
New York Weekly Tribune, New York, N. Y.
New York Weekly World, New York, N. Y.
Ontario County Times, Canandaigua, N. Y.
Orange County Farmer, Port Jervis, N. Y.
Our Country Home, Greenfield, Mass.
Pacific Rural Press, San Francisco, Cal.
Phelps Citizen, Phelps, N. Y.
Phelps Semi-Weekly Advertiser, Phelps, N. Y.
*Practical Farmer, Philadelphia, Pa.
Prairie Farmer, Chicago, Ill.
Rural New Yorker, New York, N. Y.
Texas Farmer, Fort Worth, Tex.
The Budget, Babylon, N. Y.
Issue, New York, N. Y.
Vick's Illustrated Monthly, Rochester, N. Y.
Weekly Press, Philadelphia, Pa.
Western Farmer, Madison, Wis.
Western Rural, Chicago, Ill.

We have been informed of the appearance of the bulletins in many other papers, but we only catalogue those which we have seen ourselves.

FERTILIZER ANALYSIS.

The difficulty of obtaining correct samples of fertilizer for analysis has prevented much laboratory work of this character. To every applicant for gratuitous fertilizer analysis, blanks have been furnished, giving directions for drawing the sample, and for packing the same. These directions have in but few cases been fulfilled, and the samples received have, in most cases, been valueless for our purpose. When the station undertakes the expensive work of fertilizer analysis, it seems proper that such analysis should be of public, rather than of private benefit; in other words, that we should be enabled to bear testimony as to the good quality, or the opposite, of the brand of fertilizer, and of the reliability of the manufacturer, from information gained from the samples. The following notes of samples received will illustrate the difficulties we have had to contend with in the matter of sampling:

One package of fertilizer was received with the blank form for description of sample not filled out, except with the name of the manufacturer, and the price per ton.

Three packages in paper sacks, inclosed in a common package, each package broken upon receipt, and the contents of the three more or less mixed.

One package with no name attached, or any other information.

Six packages, all accompanied with blanks filled out in the proper manner. Three packages were broken, two were in doubtful condition, and one only was satisfactory for the purposes of analysis.

One package in proper condition.

Two samples in a cloth sack, separated by tying the sack between the samples with a string; no descriptions and no identification.

Such analyses as have been made will be found in the report of the chemist.

SAMPLE ORCHARD.

In accordance with the desire of the Board of Control, as well as from a sense of the fitness of an experimental orchard, single trees, each of various varieties, were planted out, including in the selection many of the older varieties, and such of the new as were recommended by Messrs. Ellwanger and Barry as worthy of trial for the information of nurserymen and the public.

Our list includes :

Russian Apples.

Ananarnoe,
Antonoskoe,
Astravaskoe (Ostrowskoe?)
Belborodooske,
Berkoff,
Count Orloff,
Grand Duke Constantine,
Grand Sultan,

Groskoe Selenka Gruner,
Kalkidouskoe,
Karabowka,
Red Transparent,
Repka,
Workaroe,
Zarskischip.

Pears.

Andre Desportes.
Anna Nelis,
Ansault,
Belle de Beaufort,
Beurre de l'Assomption,
De Lamartine,
Doyenne du Comice,
Duhamel du Monceau,
Eugene Appert,
Fondante de Bihorel.
Frederick Clapp,
Henri Desvortes,
Hoosic.

Jacques Molet,
Jones' Seedling,
Jules Bivort,
Madame Andre Leroy,
Madame Appert,
Madame Treyve,
Marie Benoist,
Maurice Desportes,
President Mas,
Raymond de Montlaur,
St. Crispin,
Sarah,
Therese Appert.

Black Eagle,
 Black Tartarian,
 Coe's Transparent,
 Downer's Late Red,
 Early Purple Guigne,
 Elton,
 Gov. Wood,
 Knight's Early Black.
 Sparhawk's Honey,

Cleveland Bigarreau,
 Kirtland's Mary,
 Monstrueuse de Mezel,
 Napoleon Bigarreau,
 Rockport Bigarreau,
 Tradescant's Black Heart,

Bradshaw,
 Bryanstone Gage,
 Coe's Golden Drop,
 Duane's Purple,
 Fellemberg,
 General Hand,
 German Prune,
 Goliath,
 Green Gage,
 Imperial Gage,
 Jefferson,
 Lombard,
 Lucombe's Nonesuch,
 Magnum Bonum Yellow,
 DeCaradeuc,
 Newman,

Alberge Yellow,
 Alexander's Early,
 Alexandra Noblesse,
 Amsden's June,
 Bower's Early,
 Conkling,
 Cooledge's Favorite,
 Crawford's Early,
 Crawford's Late,
 Downing,
 Early Beatrice,
 Early Canada,

Cherries.

Yellow Spanish,

Belle Magnifique,
 Early Richmond,
 Empress Eugenie,
 Late Duke,
 Morello English,
 Montmorency Large Fruited,
 Montmorency Ordinaire,
 May Duke,
 Royal Duke,
 Reine Hortense,

Lieb,
 Olivet,
 Windsor.

Plums.

McLaughlin,
 Ontario,
 Orange,
 Orleans Smith's,
 Peter's Yellow Gage,
 Pond's Seedling,
 Prince Englebert,
 Prune d'Agen,
 Reine Claude de Bavay,
 Shropshire Damson,
 St. Lawrence,
 Victoria,
 Wangenheim,
 Yellow Gage,
 Weaver,
 Washington.

Peaches.

Early Louise,
 Early Rivers,
 Early Silver,
 Early York,
 Foster,
 George IV,
 Goshawk,
 Haine's Early,
 Hale's Early,
 Hill's Chilli,
 Large Early York,
 Lord Palmerston,

Magdala,
 Morris White,
 Mountain Rose,
 Mrs. Brett,
 Nectarine,
 Old Mixon Cling,
 Old Mixon Free,
 Princess of Wales,
 Red Cheek Melocoton,
 River's Early York,
 Saunders,

Shanghai,
 Snow Peach,
 Stump the World,
 Surpasse Melocoton,
 Susquehanna,
 Ward's Late Free,
 Walburton Admirable,
 Waterloo,
 Wheatstone,
 Wilder.

Apricots.

Alberge de Montgament
 Blenheim,
 Breda,
 Canino Grosso,
 DeCoulange,
 Early Golden,
 Early Moorpark,
 Hemskerk,
 Kaisha,
 Large Early,

Malcolm's Breda,
 Moorpark,
 Orange,
 Peach,
 Purple,
 Red Masculine,
 Royal,
 Sardinian,
 St. Ambroise,
 Turkey.

Nectarines.

Boston,
 Downton,
 Early Newington,
 Early Violet,
 Elruge,
 Hardwicke's Seedling,
 Late Melting,
 Lord Napier,

Milton,
 Newton,
 Pitmaston Orange,
 Red Roman,
 River's Orange,
 Spenser,
 Stanwick,
 Victoria.

Quinces.

Apple,
 Champion,
 D'Alger,

De Bourgeaut,
 De Constantinople,
 Rea's Mammoth.

Currants.

6 Cherry,
 6 Gloire des Sablons,
 6 La Versailles,
 6 London Red,
 6 Prince Albert,

6 Red Dutch,
 6 Victoria,
 6 White Dutch,
 6 White Grape.

Gooseberry.

6 Industry.

Rhubarb.

Colossal,	Myatt's Linnæus,
Early Crimson,	Prince Albert,
Early Scarlet,	Scarlet Nonpareil,
Gen. Taylor,	Scofield's Prince Albert,
Giant,	Tobolsk,
Magnum Bonum,	Victoria.
Marshall's Royal,	

METEOROLOGY.

The influence of temperature upon vegetation is an important one, but the influence of the actinism of the sun's rays has perhaps a superior influence to the temperature. Complete records in relation to plant development require the temperature, cloudiness, and intensity of action of the sun's rays to be noted, and the effects of each as a factor in excess to be studied upon the plant. We have been unable to make such observations in completeness, but have maintained a series of soil thermometers ranging in depth from one inch to two feet, and the readings made thrice daily.

The soil thermometers were made by Green, of New York, for this special purpose, the stem being lengthened and so arranged as to bring the graduation above the ground. Each thermometer was inclosed in a pine casing, for the purposes of protection, and inserted at the proper depth in spring, to remain untouched during the season. We give in another place in detail the result of the daily readings for the season of 1883 and 1884. As the soil receives its temperature from the sun, we have upon the average perhaps a better record of the seasonal temperature in the soil temperature than can be obtained through three readings only of an air thermometer.

In order to compare the seasons of 1883 and 1884, we can tabulate the soil temperatures to six inches deep, for the growing months, June, July and August, as follows:

Soil temperatures, 1883, 1884; mean of readings 1, 3 and 6 inches in depth:

	A. M.		Noon.		P. M.		Gen'l av'ge.	
	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
June 1st third.....	60.9	62.5	70.3	74.9	70.3	74.5	67.2	70.6
June 2d ".....	62.5	62.0	69.4	73.9	69.9	74.8	67.3	70.2
June 3d ".....	64.7	66.7	72.5	80.0	72.4	77.9	69.8	74.9
July 1st ".....	66.2	65.3	76.0	74.8	74.4	74.3	72.2	71.5
July 2d ".....	65.3	62.1	73.8	71.0	70.3	71.3	69.8	68.1
July 3d ".....	64.8	65.6	72.7	73.7	73.8	74.1	70.1	71.1
August 1st third.....	61.9	63.5	71.6	73.0	72.4	74.2	68.6	70.2
August 2d ".....	64.8	68.8	73.3	80.2	74.9	83.0	71.0	77.3
August 3d ".....	61.2	64.2	70.1	73.5	71.7	73.5	67.7	70.4
Mean	63.5	64.5	72.2	75.0	72.2	75.3	69.3	71.6

Number of observations 80° or above:

		1 inch.		3 inches.		6 inches.	
		1883.	1884.	1883.	1884.	1883.	1884.
June 1st	third.....	4	11	1	2	0	0
June 2d	"	0	9	0	7	0	0
June 3d	"	4	12	1	11	0	3
July 1st	"	10	9	6	8	0	1
July 2d	"	6	3	1	1	0	0
July 3d	"	3	7	0	2	0	0
August 1st	third.....	0	6	0	2	0	0
August 2d	"	6	21	2	16	0	7
August 3d	"	4	6	1	0	0	0
Total		37	84	12	49	0	11

The number of observations of the maximum air thermometer, over eighty degrees, and of the soil thermometers as above, over eighty degrees for the several months, is as below:

	1883.		1884.	
	Air.	Soil, 1 inch.	Air.	Soil, 1 inch.
June	9	8	19	32
July	13	19	11	19
August	10	10	17	33
	32	37	47	84

We thus see that the growing season of 1884 was much warmer than that of 1883.

The rainfall for several seasons has been as follows:

1882.		1883.		1884.	
No. days' rainfall recorded.	Rain, inches.	No. days' rainfall recorded.	Rain, inches.	No. days' rainfall recorded.	Rain, inches.
January.....	..	13	0.482	11	1.830
February.....	..	13	1.441	14	2.010
March.....	..	12	0.880	16	2.540
April.....	..	11	1.580	11	0.830
May .....	..	16	4.451	15	2.490
June .....	..	12	4.120	10	2.011
July.....	..	13	2.980	12	2.330
August	10	9	3.470	6	1.440
September.....	6	10	2.120	7	3.170
October	7	10	2.100	13	1.670
November.....	7	5	1.540	8	1.010
December	4	11	0.730	10	0.970
Total .....	..	135	25.894	133	22.301

Notwithstanding that the season of 1884 was decidedly warmer than that of 1883, yet in the maize crop, the difference in blooming

was not especially marked. Taking samples of early and late sweet and Flint corns, the seed from the same source for comparison, we have :

Sweet Corn.

	Planted.		Vegetated.		First bloom.	
	1883.	1884.	1883.	1884.	1883.	1884.
	May	May	May	May	July	July
Tom Thumb.....	16	19	28	27	17	17
Stowell's Evergreen...	16	19	28	27	Aug.	Aug.
					4	3

Flint Corns.

	May	May	May	May	July	July
Forty Days	16	19	28	26	14	10
Wauhakum	16	19	28	26	23	21

We note a difference in the period from planting to vegetation, for the two years, twelve days in 1883, seven or eight days in 1884, the sum of the mean soil temperatures at one inch from May 16-27, inclusive, in 1883, being 747° or about 62° a day ; from May 19-26, inclusive, in 1884, being 535° or about 67° a day.

According to Sachs, in maize, the lowest temperature at which growth takes place at the expense of the reserve material of the seed is 9°.4 C. or about 49° F. The lowest temperature at which chlorophyll granules turn green is above 43° F. and probably below 59° F. If we assume that the temperature practically required for germination is half way between these figures, or 54 F., we can make from our data the following calculation :

The temperature below 54° but slightly promotes germination. The sum of the temperatures below 54° for the twelve days is 648° and the mean observed temperature for 1883 was 747°, subtracting we have 99° for the available temperature. In 1884, in like manner, we multiply 54° by eight days, and subtract the sum from the 535° of temperature noted, leaving 103° of available temperature. We may hence conclude, from the likeness of these figures, that twelve days at 54° + 8° excess per day is the equivalent of eight days at 54° + 13° excess per day for the purposes of germination, or that a sum of daily mean temperature about 100° above a mean temperature of 54° is required for the vegetation of maize, under the practical conditions of planting in this region.

It is worthy of note that, although the temperatures during the two seasons varied, the variation in the blooming period was but slight.

	Days from vegeta- tion to bloom.	
	1883.	1884.
Tom Thumb Sweet	50	51
Stowell's Evergreen Sweet.....	68	68
Forty Days Flint	47	45
Wauhakum Flint	56	56

As growth depends upon actinism as well as temperature, it will be of little service to calculate from these varieties the sum of the temperatures during their maturing periods.

The season of 1884 between killing frosts was from May 14 to October 15, or 154 days; the season of 1883 was from May 16 to September 30, or 137 days.

FEEDING EXPERIMENT.

Digestion of food.

The experiments upon feeding commenced January 11, two cows being taken for the purpose. The cow-barn is a structure twenty-five by twenty-nine feet area and eight feet high, with a tight floor and sheathed ceiling, generally remaining above freezing temperature, but during the coldest nights water freezing therein. The food, excrement and milk were weighed upon a Fairbanks silk scale, graduated to one-quarter ounce; the cows daily, in the morning before being fed or watered, upon a Jones platform scale, graduated to one-half a pound. Milking commenced at 7 A. M., and 4:30 P. M.

During four days of each period samples were collected for analysis, the dung and the urine being separated. This latter, a point of some difficulty, was accomplished by frequent visits to the stable, day and night, during the four days, the dung being gathered carefully from the smooth floor, and the urine caught in sawdust, previously weighed. After each feeding whatever food was left was collected for analysis, and weighed.

We append in the following tables the data from January 11 to March 13, inclusive, in tabular form.

PERIOD I.

1884.	Weight of cows—Lbs.		Weight of food—Lbs.			Weight of refuse—Lbs.			Weight of water—Lbs.			Weight of excrement—Lbs.				Weight of milk—Lbs.					
	Jem.	Meg.	Corn meal.	Wheat bran.	Corn fodder.	Jem.		Meg.		Jem.		Meg.		Jem.		Meg.		Jem.		Meg.	
						M.	E.	M.	E.	M.	E.	Solids.	Liquid.	Solids.	Liquid.	M.	E.	M.	E.		
Jan.	701	809	8	8	44	.44	1.06	.13	.50	38.81	18.31	0	18.31	...	...	...	...	12.69	9.94	11.06	7.19
11	712	787	8	8	60	1.38	1.31	8	2.25	19.81	20.25	18.31	31.63	...	...	...	...	12.00	10.56	11.50	7.31
12	711	784	8	8	50	0	4.69	0	8.75	20.69	21.19	13.44	8.56	...	...	...	...	13.44	10.19	9.94	3.94
13	715	767	8	8	60	7.56	8.75	8.56	3.13	39.13	23.88	12.25	0	...	...	...	...	13.25	10.00	5.00	5.06
14	721	761	8	8	60	8.08	2.69	1.69	5.33	27.44	17.88	23.31	6.69	...	...	...	...	13.00	9.94	8.50	5.50
15	701	750	8	8	60	1.13	.38	4.69	5.56	40.19	9.75	31.19	9.69	...	...	...	...	14.00	8.94	8.69	5.69
16	701	760	8	8	60	0	0	4.94	7.94	32.25	14.00	23.81	10.81	...	...	...	...	13.00	8.81	8.81	5.88
17	704	751	8	8	60	0	0	6.00	8.06	38.88	3.38	33.56	13.31	...	...	...	...	11.31	9.13	8.56	5.63
18	700	755	8	8	60	0	0	6.87	7.50	50.00	7.06	20.25	0	...	...	...	...	11.88	9.81	8.56	5.19
19	700	734	8	8	60	0	0	6.44	6.63	30.19	11.50	21.75	17.56	...	...	...	...	12.00	8.31	8.19	5.25
20	690	740	8	8	60	0	0	4.19	5.33	37.88	18.50	35.88	21.50	...	14.75	...	...	11.06	8.44	7.81	5.25
21	707	756	8	8	60	0	0	3.44	2.25	37.19	11.06	37.94	15.06	...	11.94	...	...	11.06	8.25	8.44	5.94
22	711	763	8	8	60	0	0	2.19	2.94	36.94	17.94	32.25	5.69	...	13.50	...	...	11.00	9.63	8.94	6.88
23	709	750	8	8	60	0	0	3.00	3.38	35.19	10.56	33.31	0	...	10.00	...	...	11.56	9.06	9.25	6.75

* No corn meal to "Meg" in the evening.
† No corn meal or wheat bran to "Meg" in the morning, in the evening a hot bran mash.
‡ No corn meal to "Meg" evening or morning.
§ Weighed with Jem's.

PERIOD II.

1884.	Weight of cows.		Weight of food.				Weight of refuse.				Weight of water.				Weight of excrement.				Weight of milk.			
	Jem.	Meg.	Corn meal.	Wheat bran.	Kusillage.	Corn fodder.	Jem.		Meg.		Jem.		Meg.		Jem.		Meg.		Jem.		Meg.	
							M.	E.	M.	E.	M.	E.	Solid.	Liquid.	Solid.	Liquid.	Total.	M.	E.			
Jan.	697	787	8	8	50	30	0	0	2.81	1.94	42.94	0	41.56	19.31	98.00	.....	.....	10.06	8.56	8.25	6.63
26	704	774	8	8	110	..	0	0	.31	.69	8.25	18.56	0	20.75	114.00	.....	.....	11.13	8.19	9.56	6.63
27	708	769	8	8	120	..	0	0	0	0	0	0	0	0	98.00	.....	.....	11.06	7.31	9.50	6.63
28	698	766	8	8	130	..	0	0	0	0	0	19.19	0	0	102.00	.....	.....	11.50	8.63	9.94	7.35
29	707	773	8	8	140	..	0	0	0	0	0	0	0	0	92.00	.....	.....	11.31	8.12	9.38	8.13
30	702	772	8	8	140	..	0	0	0	0	19.13	0	0	0	104.00	.....	.....	11.19	9.44	10.31	7.75
31	711	773	8	8	140	..	0	0	0	0	0	0	0	13.00	100.00	.....	.....	12.50	9.81	11.69	7.56
Feb.	695	785	8	8	140	..	0	0	0	0	15.00	0	0	0	98.00	.....	.....	12.63	9.69	10.00	8.38
1	705	783	8	8	140	..	0	0	0	0	0	0	0	0	96.00	.....	.....	13.00	9.50	10.00	8.50
2	730	780	8	8	140	..	0	0	0	0	15.31	0	0	0	101.00	.....	.....	13.19	8.63	10.00	7.69
3	714	771	8	8	140	..	0	0	0	0	0	0	1.81	0	86.56	.....	.....	11.81	10.31	10.63	7.56
4	706	779	8	8	140	..	0	0	0	0	15.69	0	11.81	0	104.13	34.00	12.75	12.25	8.00	9.44	7.44	
5	725	786	8	8	140	..	0	0	0	0	1.81	0	0	0	97.19	37.06	13.31	13.19	9.00	10.63	7.25	
6	717	778	8	8	140	..	0	0	0	0	0	0	0	0	89.00	31.31	13.13	11.06	10.88	8.94	8.00	
7	722	784	8	8	140	..	0	0	0	0	8.00	0	0	0	88.00	38.63	10.63	13.94	8.06	10.25	7.13	
8	707	777	8	8	140	..	0	0	0	0	0	6.00	0	0	90.00	.....	.....	12.81	9.69	10.19	8.06
9	707	777	8	8	140	..	0	0	0	0	0	0	0	0	101.00	.....	.....	12.81	8.31	9.50	7.88
10	700	774	8	8	140	..	0	0	0	0	17.19	0	0	0		.....	.....			

PERIOD IV.

1884	Weight of cows.		Weight of food.			Weight of refuse.				Weight of water.				Weight of excrement.				Weight of milk.			
	Jem.	Meg.	Corn meal.	Wheat bran.	Hay.	Jem.		Meg.		Jem.		Meg.		Jem.		Meg.		Jem.		Meg.	
						M.	E.	M.	E.	M.	E.	M.	E.	Solid.	Liquid.	Solid.	Liquid.	M.	E.	M.	E.
Feb.																					
Feb. 17	704	746	8	8	40	0	3 19	1.44	5.00	36.00	13.00	30.00	20.88	.....	.....	.....	.....	11.69	8.19	10.38	6.94
18	702	749	8	8	40	2.56	0	2.38	0	31.38	21.56	21.69	20.56	.....	.....	.....	.....	12.50	8.44	9.87	7.50
19	704	738	8	8	30	38	1.06	1.06	1.38	46.69	23.19	43.75	20.56	.....	.....	.....	.....	12.69	9.56	9.63	7.31
20	702	746	8	8	40	0	3.63	1.13	2.06	42.38	20.56	43.31	21.81	.....	.....	.....	.....	12.16	9.69	10.81	8.13
21	698	755	8	8	40	3.25	2.94	0	1.38	22.31	21.56	43.31	20.81	.....	.....	.....	.....	11.69	8.94	8.56	8.06
22	674	761	8	8	40	0	1.50	.69	1.13	50.94	20.44	39.00	20.56	.....	.....	.....	.....	11.25	8.31	9.69	7.44
23	688	759	8	8	40	0	3.19	.81	1.13	42.94	21.50	41.13	22.81	.....	.....	.....	.....	11.63	7.81	9.81	7.63
24	691	755	8	8	40	0	2.88	1.44	3.88	40.75	28.50	40.50	22.88	.....	.....	.....	.....	10.81	8.69	8.81	6.81
25	696	784	8	8	40	0	2.50	.63	2.13	42.56	21.63	42.44	22.13	.....	.....	.....	.....	11.25	8.44	10.81	6.50
26	694	789	8	8	40	0	2.38	0	2.50	40.94	17.50	42.38	20.31	47.94	6.63	48.56	7.81	10.44	9.00	9.19	7.50
27	687	743	8	8	40	0	1.19	0	1.83	39.00	24.56	38.75	22.06	42.00	9.50	41.44	6.38	14.00	8.19	9.81	7.00
28	691	751	8	8	40	0	.63	0	1.31	41.56	22.06	41.81	21.13	45.44	10.19	43.00	10.19	9.69	8.13	8.63	6.63
29	689	748	8	8	40	0	.81	0	2.31	43.63	22.31	41.44	21.56	46.88	10.81	49.19	8.56	10.69	8.06	8.88	7.13

PERIOD V.

1884.	Weight of cows.		Weight of food.				Weight of refuse.				Weight of water.				Weight of excrement.				Weight of milk.			
	Jem.	Meg.	Corn meal.	Wheat bran.	Hay.	Potatoes.	Jem.		Meg.		Jem.		Meg.		Jem.	Meg.		Total.	Jem.		Meg.	
							M.	E.	M.	E.	M.	E.	M.	E.					M.	E.	M.	E.
March																						
1	689	758	8	8	20	100	0	0	0	0	39.56	21.63	43.74	19.63	...	...	...	138.	10.94	8.56	8.25	7.88
2	726	791	8	8	20	100	3.25	0	5.94	0	17.38	18.63	12.31	21.63	...	...	...	130.	10.69	9.13	9.56	7.50
3	705	733	8	8	20	100	7.63	0	5.50	0	0	22.06	0	23.00	...	...	...	123.	13.25	9.38	10.81	8.25
4	700	753	8	8	10	100	0	0	0	6.81	22.13	18.88	18.94	21.50	...	...	...	130.	11.63	9.13	9.63	8.06
5	700	759	8	8	10	100	0	0	0	2.88	10.13	17.38	0	20.13	...	...	...	111.	10.19	9.56	9.50	7.19
6	693	761	8	8	10	100	0	0	0	0	0	20.56	0	21.94	...	...	...	98.	11.75	8.69	9.81	7.50
7	691	765	8	8	20	100	1.81	0	3.88	0	20.83	0	0	41.13	...	...	...	109.	11.81	9.38	9.56	6.88
8	688	770	8	8	10	100	3.00	0	1.81	0	20.56	0	0	21.63	...	...	...	109.	10.50	9.4	8.81	6.75
9	682	761	8	8	10	100	0	0	0	0	19.94	18.75	19.56	19.56	...	...	...	123.	10.56	7.69	7.63	6.13
10	688	767	8	8	10	100	94	0	0	0	19.50	18.69	0	21.94	41.44	11.56	20.19	115.88	9.44	7.13	9.25	7.00
11	703	754	8	8	10	100	0	0	0	0	19.19	15.81	18.06	20.94	53.44	19.19	30.75	146.19	8.38	6.69	9.08	6.38
12	692	753	8	8	10	100	5.23	0	0	0	15.06	0	14.44	22.88	81.19	29.31	17.56	127.75	9.38	7.38	8.75	6.50
13	671	754	8	8	10	100	1.56	0	81	2.37	18.94	19.44	13.94	22.44	40.00	16.44	21.94	117.00	9.19	8.19	8.19	6.69

* No bran or corn meal to "Jem" in the morning.

PERIOD I.

1884.	TOTAL WEIGHTS. Lbs.						
	Cows.	Food furnish'd	Food refused.	Food consumed.	Water drunk.	Excrement passed.	Milk yielded.
Jan.							
11	1510	60	2.13	57.87	75.44	82.00	40.88
12	1499	76	4.94	71.06	90.00	98.00	41.38
13	1495	64	13.44	50.56	63.88	79.00	37.50
14	1482	70	28.00	42.00	78.25	88.00	33.31
15	1482	72	17.81	54.19	80.31	87.00	36.94
16	1451	72	11.75	60.25	90.81	85.00	37.31
17	1461	76	12.88	63.12	83.14	102.00	36.50
18	1456	76	14.06	61.94	89.13	109.00	34.63
19	1455	76	14.31	61.69	77.31	105.00	35.44
20	1434	76	13.06	62.94	81.00	95.00	33.75
21	1430	76	9.56	66.44	113.25	101.63	32.56
22	1463	76	5.69	70.31	101.25	98.88	33.69
23	1474	76	5.13	70.87	92.81	104.25	36.44
24	1459	76	6.38	69.62	79.06	104.19	36.63

PERIOD II.

25	1434	96	4.75	91.25	103.81	98.00	33.50
26	1478	126	1.00	125.00	47.56	114.00	35.50
27	1475	136	0	136.00	0	93.00	34.50
28	1464	146	0	146.00	19.19	102.00	37.44
29	1480	156	0	156.00	0	92.00	36.94
30	1474	156	0	156.00	19.13	104.00	38.69
31	1489	156	0	156.00	13.00	100.00	41.13
Feb.							
1	1480	156	0	156.00	15.00	98.00	40.69
2	1488	156	0	156.00	0	96.00	41.00
3	1510	156	0	156.00	15.31	101.00	39.50
4	1485	156	0	155.00	1.31	86.56	40.31
5	1485	156	0	156.00	27.50	104.13	37.13
6	1511	156	0	156.00	1.81	97.19	40.00
7	1495	156	0	156.00	0	89.00	38.88
8	1506	156	0	156.00	8.00	88.00	38.38
9	1479	156	0	156.00	6.00	90.00	40.45
10	1474	156	0	156.00	17.19	101.00	38.00

PERIOD III.

1884.	TOTAL WEIGHTS. Lbs.						
	Cows.	Food furnish'd	Food refused.	Food consumed.	Water drunk.	Excrement passed.	Milk yielded.
Feb.							
11	1478	106	0	106.00	0	86.00	40.63
12	1398	60	3.	57.00	120.13	95.00	38.06
13	1403	64	8.25	55.75	149.75	95.00	38.19
14	1440	56	10.25	45.75	105.00	80.00	39.00
15	1444	56	6.56	49.44	110.94	80.00	40.31
16	1451	56	5.25	50.75	100.50	81.63	40.44

PERIOD IV.

17	1450	56	9.63	46.37	99.88	87.00	37.19
18	1451	56	4.94	51.06	95.19	78.00	38.25
19	1440	46	3.88	42.12	133.19	99.00	39.06
20	1448	56	6.81	49.19	128.06	105.00	40.75
21	1453	56	6.56	49.44	108.00	107.00	37.25
22	1435	56	3.31	52.69	130.94	108.00	36.69
23	1447	56	4.63	51.37	128.38	107.00	36.38
24	1446	56	8.19	47.81	110.13	111.00	35.13
25	1430	56	5.25	50.75	128.75	111.00	36.31
26	1433	56	4.88	51.12	121.13	110.94	36.13
27	1430	56	3.06	52.94	124.38	99.31	39.00
28	1442	56	1.94	54.06	126.56	108.81	33.06
29	1437	56	3.13	52.87	128.15	114.44	34.75

PERIOD V.

Mar.							
1	1457	86	0	86.00	124.00	133.00	35.13
2	1517	136	9.19	126.81	69.94	130.00	36.88
3	1488	136	13.13	122.87	45.06	123.00	41.69
4	1458	126	6.81	119.19	76.44	130.00	38.44
5	1459	126	2.38	123.62	48.13	111.00	36.44
6	1454	126	1.75	124.25	42.50	93.00	37.75
7	1456	136	5.19	130.81	62.69	109.00	37.63
8	1458	122	4.81	117.19	42.19	109.00	35.00
9	1443	126	0	126.00	77.81	123.00	32.00
10	1455	126	1.94	124.06	60.13	115.94	32.81
11	1457	126	0	126.00	73.50	146.19	30.50
12	1445	126	6.50	119.50	52.38	127.75	32.00
13	1425	126	2.38	123.62	74.75	117.00	32.25

Analyses of Foods used.

	Water.	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
Corn meal, period I to III...	24.54	1.18	8.20	1.52	60.60	3.96
Corn meal, period IV....	20.30	1.17	9.06	1.41	65.83	2.23
Corn meal, period V.....	21.00	1.29	8.02	1.74	64.62	2.33
Wheat bran, period I to V...	13.72	6.12	13.69	10.52	53.09	2.86
Fodder corn.....	56.49	2.71	3.40	15.46	20.64	1.30
Ensilage.....	84.58	.91	1.13	5.01	7.22	1.15
Soja bean fodder.....	21.23	8.37	8.42	22.34	38.29	1.35
Hay.....	15.22	4.94	5.14	31.28	41.36	2.06
Potatoes, small.....	78.88	.89	2.28	.61	17.27	.67

Analysis of waste or rejected food.

	Water.	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
Period I.....	75.26	1.25	1.25	8.89	12.54	.81
Period II.....	.....	.....	.....	.....	.....	.....
Period III.....	34.07	6.36	6.34	21.40	30.85	.98
Period IV.....	29.36	5.48	3.93	25.04	34.59	1.60
Period V.....	34.21	6.07	7.86	5.83	44.04	1.99

Analysis of Dung.

		Water.	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
I.	Jan. 21. Jem.....	83.06	1.62	1.97	4.85	8.09	.41
	Meg.....	83.56	1.77	2.02	4.22	8.00	.43
	Jan. 22. Jem.....	83.32	1.63	1.91	4.80	7.89	.45
	Meg.....	84.24	1.62	1.95	4.11	7.65	.43
	Jan. 23. Jem.....	84.90	1.55	1.66	4.28	7.25	.36
	Meg.....	83.32	1.60	1.89	4.38	8.36	.45
	Jan. 24. Jem.....	86.46	1.38	1.59	3.86	6.40	.31
	Meg.....	83.41	1.61	1.96	4.48	8.12	.42
II.	Feb. 4. Jem.....	84.56	1.72	1.95	4.23	7.08	.46
	Meg.....	83.94	1.78	2.07	4.15	7.56	.50
	Feb. 5. Jem.....	85.71	1.53	1.75	3.95	6.69	.37
	Meg.....	84.99	1.55	1.82	4.04	7.18	.42
	Feb. 6. Jem.....	84.72	1.62	1.84	4.17	7.19	.46
	Meg.....	84.77	1.60	1.87	4.18	7.11	.47
	Feb. 7. Jem.....	84.36	1.69	1.94	4.40	7.19	.42
	Meg.....	84.56	1.80	1.80	4.20	7.20	.44
III.	Feb. 16. Jem.....	80.80	3.68	2.16	6.24	6.57	.55
	Meg.....	79.05	4.28	2.43	6.80	6.83	.61
IV.	Feb. 26. Jem.....	80.76	1.74	2.01	6.52	8.33	.64
	Meg.....	79.94	1.69	1.73	7.19	8.86	.59
	Feb. 27. Jem.....	80.00	1.70	1.89	6.91	8.92	.58
	Meg.....	80.05	1.64	1.69	7.56	8.56	.50
	Feb. 28. Jem.....	79.25	1.74	1.97	7.37	9.04	.63
	Meg.....	79.85	1.63	1.74	7.81	8.42	.55
	Feb. 29. Jem.....	79.42	1.62	1.84	7.44	9.20	.48
	Meg.....	79.43	1.64	1.80	7.46	9.11	.56
V.	Mar. 10. Jem.....	82.87	2.19	2.74	3.57	8.02	.61
	Meg.....	81.02	3.30	2.37	3.67	8.92	.72
	Mar. 11. Jem.....	84.97	1.92	2.02	3.44	7.18	.47
	Meg.....	82.80	2.21	2.11	3.89	8.52	.47
	Mar. 12. Jem.....	79.16	2.76	2.81	4.14	10.60	.53
	Meg.....	81.38	2.67	2.11	3.83	9.49	.52
	Mar. 13. Jem.....	80.92	2.61	2.60	3.74	9.61	.53
	Meg.....	81.96	2.85	1.94	3.49	9.18	.59

Milk Analysis. — Jem.

DATE.		Water.	Fat.	Caseine.	Sugar.	Ash.
Jan.	21. P. M.....	84.71	6.11	3.61	4.97	.60
	22. A. M.....	85.59	4.63	....	...	.69
	22. P. M.....	84.98	5.50	3.61	5.21	.75
	23. A. M.....	86.29	4.03	3.61	5.34	.73
	23. P. M.....	84.38	6.33	3.55	5.00	.74
	24. A. M.....	85.60	4.85	3.61	5.23	.71
	24. P. M.....	84.48	6.16	3.55	5.06	.75
	25. A. M.....	85.40	4.91	...	....	.70
	26. A. M.....	85.05	5.25	....	....	.72
	26. P. M.....	83.90	6.41	....	....	....
	27. A. M.....	85.13	5.36	....	...	....
	27. P. M.....	84.76	5.64	....	....	....
	28. A. M.....	85.16	5.17	....	....	...
	28. P. M.....	84.08	6.52	....	....	....
	29. A. M.....	85.49	4.99	....	....	....
	29. P. M.....	84.98	5.60	....	...	....
	30. A. M.....	86.36	4.26	....	....	...
	30. P. M.....	85.08	5.53	....	....	....
	31. A. M.....	85.91	4.57	....	....	...
	31. P. M.....	85.58	5.20	....	....	....
Feb.	1. A. M.....	86.63	3.97	....	....	...
	1. P. M.....	85.83	5.36	....	....	....
	2. A. M.....	86.10	4.53	....	....	....
	2. P. M.....	84.73	5.57	....	....	....
	3. A. M.....	85.71	4.63	....	....	....
	3. P. M.....	85.23	5.35	....	....	....
	4. A. M.....	86.88	3.81	....	....	....
	4. P. M.....	84.96	5.52	2.85	5.91	.76
	5. A. M.....	85.72	4.77	3.23	5.56	.72
	5. P. M.....	85.59	5.16	3.23	5.27	.75
	6. A. M.....	86.20	4.46	3.48	5.17	.69
	6. P. M.....	85.09	5.60	3.29	5.27	.75
	7. A. M.....	87.11	3.44	3.42	5.34	.69
	7. P. M.....	84.69	6.11	3.29	5.19	.72
	8. A. M.....	85.80	4.92	3.42	5.21	.65
	11. P. M.....	84.72	6.16	....	....	....
	12. A. M.....	86.04	4.23	...	....	....
	12. P. M.....	84.79	5.51	....	...	....
	13. A. M.....	85.64	4.43	....	....	....
	13. P. M.....	84.74	5.76	....	....	....
	14. A. M.....	86.15	4.27	....	....	....
	14. P. M.....	85.31	5.36	....	....	....
	15. A. M.....	86.01	4.44	3.48	....	....
	15. P. M.....	84.20	6.57	3.42	....	....
	16. A. M.....	85.53	5.08	....	....	....
	16. P. M.....	84.30	6.56	3.67	....	....
	17. A. M.....	85.68	4.98	3.42	....	....
	19. A. M.....	85.77	4.98	....	....	....
	19. P. M.....	84.37	6.80	....	...	....
	20. A. M.....	85.87	4.36	....	....	....
	20. P. M.....	84.19	6.63	....	....	....
	21. A. M.....	85.96	4.73	....	....	....
	21. P. M.....	84.51	6.37	....	....	....
	22. A. M.....	84.70	5.52	....	....	....
	22. P. M.....	84.46	6.38	....	....	....
	23. A. M.....	85.26	5.09	....	....	....

Milk Analysis. — Jem. — (Continued.)

DATE.		Water.	Fat.	Caseine.	Sugar.	Ash.
Feb.	23. P. M.	84.41	6.18	....	....	....
	26. A. M.	85.99	4.50	....	....	....
	26. P. M.	85.53	5.14	....	....	.70
	27. A. M.	84.26	6.39	....	....	.67
	27. P. M.	84.67	5.94	....	....	.71
	28. A. M.	86.04	4.30	....	....	.72
	28. P. M.	85.14	5.15	....	....	.77
	29. A. M.	85.99	4.44	3.61	....	....
	29. P. M.	85.01	5.53	3.48	....	....
Mar.	1. A. M.	85.30	4.65	3.54	....	....
	5. P. M.	85.19	4.91	....	....	....
	6. A. M.	84.80	5.67	....	....	....
	10. P. M.	84.44	5.50	....	....	....
	11. A. M.	84.10	6.08	....	....	....
	11. P. M.	84.83	5.65	....	....	....
	12. A. M.	85.22	5.01	....	....	....
	12. P. M.	84.67	5.86	....	....	....
	18. A. M.	85.20	5.08	3.48	....	....
	18. P. M.	84.86	5.32	3.60	....	....
	14. A. M.	85.39	4.91	3.73	....	....

Meg.

Jan.	21. P. M.	84.61	6.11	3.86	4.82	.60
	22. A. M.	84.86	5.21	3.92	5.27	.74
	22. P. M.	84.87	5.58	3.86	4.94	.61
	23. A. M.	85.51	4.71	4.05	4.96	.77
	23. P. M.	84.55	5.96	3.92	4.80	.77
	24. A. M.	85.61	4.72	....	....	.73
	24. P. M.	84.20	6.31	....	....	.76
	25. A. M.	84.77	4.94	....	....	.61
Feb.	4. A. M.	84.10	6.34	3.67	5.16	.73
	5. A. M.	86.15	4.11	3.67	5.44	.63
	5. P. M.	85.98	4.61	3.48	5.20	.73
	6. A. M.	86.10	4.39	3.54	5.28	.69
	6. P. M.	....	5.45	3.54	....	.72
	7. A. M.	87.01	3.49	3.67	5.18	.65
	7. P. M.	86.13	4.46	3.54	5.15	.72
	8. A. M.	86.31	4.29	3.61	5.08	.71
	14. A. M.	86.57	3.69	....	....	....
	14. P. M.	85.50	4.90	....	....	....
	15. A. M.	86.50	3.81	3.73	....	....
	15. P. M.	85.57	5.05	3.61	....	....
	16. A. M.	86.03	4.32	....	....	....
	16. P. M.	85.11	5.49	3.48	....	....
	17. A. M.	85.68	4.74	3.67	....	....
	26. A. M.	86.00	4.20	....	....	....
	26. P. M.	85.40	4.81	....	....	.69
	27. A. M.	85.36	4.86	....	....	.70
	27. P. M.	85.20	5.30	....	....	.74
	28. A. M.	86.58	3.78	....	....	.72
	28. P. M.	85.35	4.77	....	....	.77
	29. A. M.	86.60	3.50	3.80	....	....
	29. P. M.	86.08	4.30	3.61	....	....

Milk Analysis. — Meg. — (Continued.)

DATE.	Water.	Fat.	Caseine.	Sugar.	Ash.
Mar. 1. A. M.....	86.11	4.02	3.80	....	....
10. P. M.....	83.73	6.43	....	....	....
11. A. M.....	85.35	5.02	....	....	....
11. P. M.....	85.53	4.83	....	....	....
12. A. M.....	86.87	3.93	....	....	....
12. P. M.....	86.06	4.20	....	....	....
13. A. M.....	86.41	3.69	4.05	....	....
13. P. M.....	86.05	4.07	4.11	....	....
14. A. M.....	86.07	4.32	3.80	....	....

We were unable to obtain full data for the whole period, on account of the labor involved, so we were forced to select a few days from each period for a more complete record, and these days were taken toward the close of each period so as to embrace a time when the cows might be expected to have come under the full influence of the food consumed by them. Period III was necessarily short, as we had but a limited supply of the Soja bean forage; the other periods were, in our judgment, sufficiently long for our purpose.

The scheme of our trial was to feed the same quantity of grain each day, so as to be certain to maintain the animals in condition, and to this fixed quantity to add the various materials whose feeding value we were desirous of obtaining.

The fixed ration in all the periods was four pounds of corn meal and four pounds of wheat bran daily per cow. During Period I, air-dried fodder corn was added in such quantity as the cows would consume; in Period II, the same fodder-corn ensilaged; in Period III, the Soja bean plant in a dry condition; in Period IV, the ordinary hay of the farm, largely timothy; in Period V, potatoes and a small quantity of hay.

The first question that meets us is the change of live weights in the cows under trial, and for this purpose we present a table which, by various calculations, seems to show that the weights remained tolerably constant, although when examined in detail we observe slight falling off in some of the periods, and a gain in others.

Average daily weight of the two cows in pounds per cow:

	Periods.				
	I.	II.	III.	IV.	V.
For whole period.....	734	741	718	721	730
For first four days.....	748	731	713	724	740
For last four days	728	744	722	718	715
For first half	742	736	713	723	736
For second half... ..	726	746	722	719	724

This table indicates that, so far as the maintenance of live weight was concerned, the ensilage was superior to the same raw material air-dried; that the fodder corn in the quantities fed was the superior to hay; that the Soja bean was a nutritious food, and that potatoes were of inferior value. The quantities fed were not, however, true equivalents, and the results gained must be interpreted according to the conditions of the experiment.

We will next call attention to the apparent result of the rations used upon the milk yield, calculated in like manner in order to bring into view the fluctuations which are seemingly dependent upon the food.

Average daily milk yield in pounds per cow:

	Periods.				
	I.	II.	III.	IV.	V.
For whole period	18.11	19.19	19.72	18.46	17.63
For first four days	19.14	17.62	19.49	19.41	19.02
For last four days	17.42	19.52	19.74	17.87	15.95
For first half	18.84	18.75	19.48	19.03	18.86
For second half	17.37	19.61	19.96	17.89	16.41

This table clearly shows that under the fodder-corn feeding, Period I, there was a gradual falling off in milk, as also under the hay feeding, Period IV, and the hay and potatoes, Period V. On the contrary, under the ensilage feeding, Period II, the milk increased, as it did also while the Soja bean was being fed, Period III.

In order to interpret these results it is necessary for us to inquire as to the correspondences between the rations; this we may at present do with the weights alone, leaving the chemical analysis for after consideration.

Average daily weight of food per cow in pounds:

	Periods.				
	I.	II.	III.	IV.	V.
Weight of food consumed.	30.82	74.30	30.39	25.07	60.38
Dry matter of food	18.68	16.97	20.71	21.36	21.20
Water drank	42.70	8.67	48.86	60.10	32.67
Water in food and drink	60.52	66.17	58.65	63.81	73.71

This table enables us to show that the less dry weight of ensilage, Period II, was connected with a greater maintenance of live weight, and a larger yield of milk than the larger dry weight of fodder-corn, Period I. It also shows that the 18.68 pounds of dry matter of the fodder-corn ration, Period I, was equal, if not superior, to the 21.36 pounds of dry matter of the hay ration, Period IV. The nearly equivalent dry weights of food in the Periods IV

and V, indicate a low value for potatoes when fed in the quantities indicated. The potatoes, indeed, seem to have a diuretic effect, as is indicated by the following table, calculated for each full period and which will be more accurately given in succeeding tables founded upon observations of the four days while under the full influence of the food used.

Excrement passed, pounds per cow :

	Periods.				
	I.	II.	III.	IV.	V.
Dung and urine	47.82	48.65	43.13	51.78	60.30
Dry excrement	5.94	5.35	6.33	8.76	7.33
Water in excrement	41.88	43.30	36.80	43.02	52.97

The influence of these rations upon the milk can be shown in tabular form, based on fourteen analyses during Period I, thirty-six during Period II, seventeen during Period III, twenty-eight during Period IV, and nineteen during Period V.

Average daily milk yield per cow in pounds:

	Periods.				
	I.	II.	III.	IV.	V.
Dry matter of milk	2.71	2.77	2.86	2.70	2.59
Water of milk	15.40	16.42	16.86	15.76	15.04
Total milk	18.11	19.19	19.72	18.46	17.63

We thus note that all the apparent teaching of the experiment is that ensilage has a food value beyond that of the raw material of which it is composed; that with grain feeding, fodder-corn has a value beyond that which common experience gives it; that potatoes are not of especial value for feeding in quantity. We would caution that our cows were Jerseys, and it is possible that with other breeds a different result might be gained, or possibly there is a difference between individual cows. We hesitate, therefore, to generalize, but will be understood as discussing only the facts of our experiment.

Before proceeding further, we will mass the data which the more complete weighings of four days of each period (except Period III, which includes but one day) furnishes, and which will serve for a further discussion, to be based upon figures, which must serve as premises, and which we believe are as accurate as can be obtained with our facilities, which include all that forethought and opportunity could supply

For four days of each period, (except period III, one day):

Daily to lbs.	Periods.				
	I.	II.	III.	IV.	V.
Average weight per cow.....	728	747	725	718	715
Average weight of food consumed..	84.65	78.00	25.87	26.37	61.43
Average weight of water drunk	48.30	3.82	50.25	62.62	32.60
Average weight of dung.....	39.74	33.83	29.81	45.49	42.48
Average weight of urine.....	11.87	13.27	11.00	8.70	20.87
Average weight of mil_	17.41	19.55	20.22	17.87	15.95
Average weight consumed:					
of dry matter.....	18.70	17.22	20.17	19.00	17.31
of water	68.95	60.78	56.75	65.02	72.01
Average weight passed:					
of dry dung..	6.85	5.18	5.98	9.17	7.70
of water in dung and urine.....	44.77	41.93	34.83	45.01	55.65
Average weight yielded:					
of dry milk.....	2.60	2.76	2.98	2.57	2.32
of water in milk	14.81	17.29	17.24	15.30	13.63
Total dry matter:					
consumed.....	18.70	17.22	20.17	19.00	17.31
collected in dung and milk.....	8.95	7.94	8.96	11.74	10.02
Total water:					
consumed.	68.95	60.78	56.75	65.02	72.01
collected in excrement and milk..	59.58	59.22	52.07	60.31	69.28
Total dry matter retained, lbs	9.75	9.28	11.21	7.26	6.29
Total water retained, lbs.....	4.37	1.56	4.68	4.71	2.73

When we have the weights of the food fed, and of the dung excreted, we can analyze both in the same way, and thus determine the quantity of each nutrient which enters and leaves the body, the difference between the total amount of the dry matters in fodders and dungs giving very approximately the amount that has been digested. Let us then observe whether this process will give us indications of the feeding values of our rations, leaving to another place the consideration of the component parts.

	Periods.				
	I.	II.	III.	IV.	V.
Dry matter consumed, lbs	18.70	17.22	20.17	19.00	17.31
Dry dung collected, lbs.....	6.85	5.18	5.98	9.17	7.70
Difference, or digested, lbs.....	12.35	12.04	14.19	9.83	9.61
Per cent.....	66.	70.	70.	52.	55.

Before passing to the consideration of the digestion of the component parts of the foods, it may be desirable to call attention to the reliability of some of our methods. Excluding period III from our consideration, as of being continued for too short a period to secure proper results, we may call attention to the uniformity or lack of it which exists between the averages of two adjoining periods within each trial, as it will thus appear whether the preceding food has been eliminated from the intestines of the animal.

Daily ranges during portions of periods.

	I.		II.	
	Jan. 17-20.	Jan. 21-24.	Jan. 31 to Feb. 3.	Feb. 4-7.
Av. weight of cow.....	726.	728.	745.	747.
“ weight of food consumed	31.2	34.6	78.0	78.0
“ weight of water drunk...	41.4	48.3	5.4	3.8
“ weight of excrement	51.3	51.1	49.4	47.1
“ weight of milk.....	17.5	17.4	20.3	19.5

	IV.		V.	
	Feb. 22-25.	Feb. 26-29.	Mar. 6-9.	Mar. 10-13.
Av. weight of cow.....	719.	718.	726.	715.
“ weight of food consumed	25.3	26.3	62.2	61.4
“ weight of water drunk...	62.3	62.6	28.1	32.6
“ weight of excrement	54.6	54.2	54.2	63.3
“ weight of milk.....	18.0	17.8	17.8	15.9

The correspondences between the second and third four days of each period seem as close as could be expected, and seem to indicate that our method of taking four day periods is a reliable one.

It may be of interest to note the individual variations between the cows, and we, therefore, present some data which cover the four days of the periods (except Period 3, one day) during which the excrement was collected separately.

	I.		II.		III.		IV.		V.	
Daily average	Jem.	Meg.	Jem.	Meg.	Jem.	Meg.	Jem.	Meg.	Jem.	Meg.
Weight of cow, lbs.....	704	752	715	778	698	753	690	745	689	757
Food consumed, lbs.....	88.0	81.8	78.0	78.0	24.8	25.9	26.7	26.0	61.0	61.8
Water drunk, lbs	51.2	45.4	4.8	8.8	57.8	43.2	62.9	62.4	31.5	33.6
Dung, lbs.....	45.0	34.4	34.0	33.7	29.9	29.7	45.4	45.5	41.5	43.4
Urine, lbs	10.2	12.5	12.4	14.1	10.5	11.5	9.1	8.2	19.1	22.6
Milk, lbs.....	20.0	14.8	21.6	17.5	22.6	17.8	19.5	16.2	16.4	15.4

Calculating these tables upon the dry matter received and passed, we have:

Daily dry										
Food consumed, lbs.....	19.5	17.9	17.3	17.3	20.1	20.8	20.3	18.3	16.0	18.0
Dung passed, lbs.....	7.0	5.6	5.5	5.2	5.7	6.2	9.1	9.2	7.5	7.8
Milk yielded, lbs.....	3.1	2.8	2.8	2.5	3.4	2.5	2.9	2.3	2.5	2.2
Per cent of dry dung to dry food.....	35.9	31.7	31.8	30.0	28.3	29.8	44.8	50.2	46.9	43.3
Per cent of dry food to weight of cow.....	2.63	2.24	2.42	3.22	2.88	2.76	2.94	2.45	2.32	2.37

These figures justify the belief that the two cows were well selected for the experiment, and a study of the differences must give additional confidence to our results based upon the averages of the two.

We may now inquire as to the digestibility of these various rations, the amount of grain fed being uniform during each period,

namely, four lbs. corn meal and four lbs. wheat bran per cow, and the rations being in materials as below.

Period	I. Grain and fodder corn.
"	II. Grain and same fodder corn ensilaged.
"	III. Grain and Soja bean fodder.
"	IV. Grain and hay.
"	V. Grain, hay and potatoes.

Digestion of component parts of food :

PERIOD I.

Grain and Fodder Corn.

Jem.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.	1.90	5.12	10.73	.67
Daily dung, lbs. ....	.80	2.00	3.33	.17
Difference, or digested, lbs.	1.10	3.12	7.40	.50
Difference per cent.	58.	61.	69.	75.

Meg.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.	1.82	4.52	9.89	.62
Daily dung, lbs. ....	.67	1.48	2.76	.15
Difference, or digested, lbs.	1.15	3.04	7.13	.47
Difference per cent.	63.	67.	72.	76.

PERIOD II

Grain and Ensilage.

Jem.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.	1.67	3.99	9.59	1.08
Daily dung, lbs. ....	.63	1.43	2.40	.14
Difference, or digested, lbs.	1.04	2.56	7.19	.94
Difference per cent.	62.	64.	75.	87.

Meg.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.	1.67	3.99	9.59	1.08
Daily dung, lbs. ....	.64	1.39	2.46	.15
Difference, or digested, lbs.	1.03	2.60	7.13	.93
Difference per cent.	62.	65.	74.	86.

PERIOD III.
Grain and Soja Bean.
Jem.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.....	2.36	4.28	11.23	.52
Daily dung, lbs.....	.64	1.87	1.96	.16
Difference, or digested, lbs.....	1.72	2.41	9.27	.36
Difference per cent.....	73.	56.	82.	69.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.....	2.43	4.51	11.57	.58
Daily dung, lbs.....	.72	2.02	2.02	.18
Difference, or digested, lbs.....	1.71	2.49	9.55	.35
Difference per cent.....	70.	55.	82.	66.

PERIOD IV.
Grain and Hay.
Jem.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.....	1.86	6.42	12.38	.67
Daily dung, lbs.....	.87	3.20	4.03	.26
Difference, or digested, lbs.....	.99	3.22	8.35	.41
Difference per cent.....	53.	50.	67.	60.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.....	1.84	6.23	12.12	.66
Daily dung, lbs.....	.79	3.41	3.98	.25
Difference, or digested, lbs.....	1.05	2.82	8.14	.41
Difference per cent.....	57.	45.	67.	62.

PERIOD V.
Grain, Hay and Potatoes.
Jem.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.....	2.12	2.23	14.39	.38
Daily dung, lbs.....	1.05	1.54	3.67	.22
Difference, or digested, lbs.....	1.07	.69	10.72	.16
Difference per cent.....	51.	31.	74.	42.

Meg.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Daily food and water, lbs.....	2.18	2.27	14.71	.40
Daily dung, lbs.....	.92	1.61	3.92	.24
Difference, or digested, lbs.....	1.26	.66	10.79	.16
Difference per cent.....	58.	29.	73.	40.

We may now group our results in order to bring into view the correspondences between the results from the two cows.

Digestion percentages of the rations.

	I.		II.		III.		IV.		V.	
	Jem.	Meg.	Jem.	Meg.	Jem.	Meg.	Jem.	Meg.	Jem.	Meg.
Albuminoid.....	58	63	62	62	73	70	53	57	51	58
Crude fiber.....	61	67	64	65	56	55	50	45	31	29
Nit. free extract.....	69	72	75	74	82	82	67	67	74	73
Fat.....	75	76	87	86	69	66	60	62	42	40

Digestion percentages of the ration. Average of the two cows.

	I.	II.	III.	IV.	V.
Albuminoid	60	62	71	55	54
Crude fiber.....	64	64	55	47	30
Nit. free extract.....	70	74	82	67	73
Fat.....	75	86	67	61	41
Total dry matter.....	66	70	70	52	55

In order to determine the digestibility of any component of the ration, we must know the digestibility of one of the foods, and by subtraction obtain the digestion value of the other. Using the German figures for the digestibility of the grain fed,* we can form the following provisional table:

* It is probable that by using the German results, we are reducing the apparent percentages of digestion in our trials, as there is indication that the figures taken for the digestion of the grain are in excess of the real digestion in our case.

PERIOD. I

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Fed, in fodder corn, lbs.....	.99	4.34	5.77	.37
Eight lbs. grain, lbs.....	.88	.49	4.54	.28
Fed total.....	1.87	4.83	10.31	.65
Dung excreted, lbs.....	.73	1.74	3.04	.16
Total digested, lbs.....	1.14	3.09	7.27	.49
Digested from grain, as per German tables, lbs.....	.65	.18	3.77	.22
Digested from fodder corn, lbs....	.49	2.91	3.50	.27
Per cent digested.....	49.	67.	61.	73.

PERIOD II.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Fed in ensilage, lbs.....	.79	3.50	5.05	.80
Eight lbs. grain, lbs.....	.88	.49	4.54	.28
Fed total.....	1.67	3.99	9.59	1.08
Dung excreted.....	.63	1.41	2.43	.14
Total digested, lbs.....	1.04	2.58	7.16	.94
Digested from grain, as per German tables, lbs.....	.65	.18	3.77	.22
Digested from ensilage, lbs.....	.39	2.40	3.39	.72
Per cent digested.....	49.	69.	67.	90.

PERIOD III.

	Alb.	Crude fiber.	Nit. free extract	Fat.
Fed in Soja bean fodder, lbs.....	1.50	3.90	6.86	.24
Eight lbs. grain, lbs.....	.88	.49	4.54	.28
Fed total, lbs.....	2.38	4.39	11.40	.52
Dung excreted, lbs.....	.68	1.94	1.99	.17
Total digested, lbs.....	1.70	2.45	9.41	.35
Digested from grain, as per German tables, lbs.....	.65	.18	3.77	.22
Digested from Soja fodder.....	1.05	2.27	5.64	.13
Per cent digested.....	70.	58.	82.	54.

PERIOD. IV.

	Alb.	Crude fiber.	Nit. free extract.	Fat.
Fed in hay, lbs.....	.97	5.83	7.71	.38
Eight lbs. grain, lbs.....	.88	.49	4.54	.28
Fed total, lbs.....	1.85	6.32	12.25	.66
Dung excreted, lbs.....	.83	3.30	4.00	.25
Total digested, lbs.....	1.02	3.02	8.25	.41
Digested from grain, as per German tables, lbs.....	.65	.18	3.77	.22
Digested from hay.....	.37	2.84	4.48	.19
Per cent.....	40.	49.	58.	50.

PERIOD V.

On account of the amount of waste, or unconsumed ration, we find ourselves unable to distribute the amount of albuminoid, etc., consumed among the component parts, and hence we cannot even approximately figure the percentage of digestibility of the potatoes.

Taking the average weight of the two cows for the four days preceding the digestion trial, and during the trial, we note a close approximation to maintenance as follows:

	Periods.				
	I.	II.	III.*	IV.	V.
Average weight per cow for.					
Four days preceding, lbs....	726	745	722	719	726
Four days of trial, lbs.....	728	747	725	718	715

We may hence assume with considerable probability, that upon the whole a maintenance weight was retained, and the various quantities of foods were near equivalents. Under this assumption, we can form the following table:

	Periods.				
	I.	II.	III.	IV.	V.
Av. weight of food consumed, lbs.	34.65	78.00	25.37	26.37	61.43
Subtract weight of grain fed....	8.00	8.00	8.00	8.00	8.00
Balance.....	26.65	70.00	17.37	18.37	53.43

This interprets that about twenty-six pounds of fodder corn was the equivalent of seventy pounds of ensilage, or seventeen pounds of Soja bean, or eighteen pounds of hay, or about four pounds of hay and fifty pounds of potatoes, etc. Expressing these results in tabular form.

* One day only.

100 lbs. hay was the equivalent to 145 lbs. fodder corn.
100 lbs. hay was the equivalent to 381 lbs. ensilage.
100 lbs. hay was the equivalent to 94 lbs. Soja bean fodder.
100 lbs. fodder corn was the equivalent to 262 lbs. ensilage.
100 lbs. fodder corn was the equivalent to 69 lbs. hay.
100 lbs. fodder corn was the equivalent to 65 lbs. Soja bean fodder.
100 lbs. ensilage was the equivalent to 38 lbs. fodder corn.
100 lbs. ensilage was the equivalent to 26 lbs. hay.
100 lbs. ensilage was the equivalent to 25 lbs. Soja bean fodder.

In using the results of this trial, it must be borne in mind that fodder corn, although a well known food, is yet of very indeterminate composition on account of the various stages in which it may be harvested, as also from its hygroscopic properties. In some experiments by Professors S. W. Johnson and E. H. Jenkins in 1874 and 1875, attention was called to this hygroscopic property of maize fodder, the field cured fodder, November 11, containing 27.59 and 26.92 per cent water in two samples, and in barn, February 8, containing 53.76 and 54.95 per cent water. As these examples were from a similar variety of corn to that used by us, stored in like manner, and harvested as near as can be ascertained in nearly the same condition of ripeness, it may be well to compare the analyses.

	Water.	Ash.	Albu- minoid.	Crude fiber.	Nit.—free extract.	Fat.
In barn, Feb. 8, 1875. Johnson..	53.76	3.04	3.18	18.51	23.22	0.99
Another sample.	54.95	2.24	2.34	15.52	24.29	0.66
In barn, Jan. 21, 1884. N. Y. Sta.	56.49	2.71	3.40	15.46	20.64	1.30

The same calculated dry :

	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
Johnson. 1875, No. 1.....	6.57	6.87	34.19	50.23	2.14
Johnson. 1875, No. 2.....	4.95	5.19	34.45	53.95	1.46
N. Y. Station, 1884.....	6.23	7.81	35.54	47.44	2.98

The same remarks as to the inequality of fodder corn analyses apply to ensilage in so far as the difference in samplings: thus in 1882 silo, the New York station analyses of samples taken February 15, 1883, and March 29, 1883, were :

	Water.	Ash.	Albu- minoid.	Crude fiber.	Nit.—free extract.	Fat.
Ensilage: February 15.....	78.61	1.50	1.60	7.10	10.22	.97
Ensilage: March 29.....	82.35	1.05	.87	5.87	8.72	1.14

The same calculated dry :

	Ash.	Albu- minoid.	Crude fiber.	Nit.—free extract.	Fat.
Ensilage: February 15....	6.99	7.50	33.20	47.78	4.53
Ensilage: March 29.....	5.95	4.94	33.27	49.38	6.46

	Water.	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
Ensilage: January 25, 1884...	84.58	.91	1.13	5.01	7.22	1.15

The same calculated dry :

	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
Ensilage, January 25, 1884..	5.92	7.31	32.48	46.84	7.45

The variation that may occur between various analyses of ensilage are given by Professor Johnson, from seventeen analyses, as follows :

	Water.	Ash.	Alb.	Crude fiber.	Nit.—free extract.	Fat.
Minimum in 17 cases.....	74.2	0.8	0.9	4.7	7.0	0.3
Maximum in 17 cases.....	84.9	1.8	1.9	7.9	18.0	0.9

The difficulty of sampling such a material as fodder corn or ensilage so as to study the chemical changes which take place in the silo seems insuperable with our present methods, for Professor Johnson finding a difference of 3.39 per cent in the albuminoid of two duplicate samples of the dry material of fresh fodder corn, wisely comes to the conclusion that “these analyses demonstrate that this method of working is incompetent to give any clear notions as to the quantity or even as to the kind of changes that go on in the silo.”

Our own analyses of ensilage of 1882, gives, as is noted in the preceding table, a difference of 2.56 per cent between the albuminoid of two samples of ensilage from the same silo, and corroborates Professor Johnson’s conclusion. We, however, give the result of analyses of the fodder corn and the same ensilaged, and Professor Johnson’s results for comparison, as indicating changes without proving the same for the reasons given.

Calculated dry :

	Ash.	Albu- minoid.	Crude fiber.	Nit.—free extract.	Fat. (Ether extract.)
Fodder corn, N. Y. Station, 1883.	6.23	7.81	35.54	47.44	2.98
Same ensilaged, N. Y. Sta., 1883.	5.92	7.31	32.48	46.84	7.45
Fodder corn, Prof. Johnson, 1881.	6.77	11.95	32.62	47.20	1.46
Same ensilaged, Prof. J’hns’n, 1881.	7.42	11.25	32.83	45.50	3.00

The hay used in our experiments was of mixed grasses, some weeds, Timothy grass rather predominating, cut early. Our analysis indicates poor quality, as may be seen from the following comparisons :

	WATER FREE.				
	Ash.	Albu- minoid.	Crude fiber.	Nit.—free extract.	Fat.
N. Y. station hay	5.83	6.06	36.89	48.79	2.43
Average nine analyses timothy hay (Conn. Rep’t)	4.47	7.11	33.45	53.03	1.94

The potatoes used in our trials were small potatoes, White Star variety, the refuse of our crops, and just such as would naturally be fed ; the analysis differs somewhat from what would be yielded by merchantable potatoes on account of the greater quantity of skin in proportion to interior.

	Water.	Ash.	Albu- minoid.	Crude fiber.	Nit. free extract.	Fat.
N. Y. station, 1883, small potatoes, White Star....	78.88	.89	2.28	.61	17.27	.07
Washington market, C. Richardson, Norfolk ...	77.61	.96	1.32	.28	19.69	.14
Washington market, C. Richardson, Early Rose.	79.69	.82	1.14	.48	17.75	.12

In Bulletin No. 3 of the Agricultural Experiment Station, University of Wisconsin, are the results of digestion experiments with sheep. With the exception of our digestion experiment with fodder corn and ensilage, these are, so far as we know, the first trials published in this country, and hence we incorporate the results, along with our own, in tabular form, as below :

AMERICAN DIGESTION EXPERIMENTS.

	PER CENT DIGESTED.			
	Albu- minoid.	Crude fiber.	Nit. free extract.	Fat.
1. Corn fodder, milch cows, N. Y. station.	49	67	61	73
2. Ensilage, milch cows, N. Y. station..	49	69	67	90
3. Soja bean fodder, milch cows, N. Y. station	70	58	82	54
4. Meadow hay, milch cows, N. Y. station	49	49	58	50
5. Clover hay, sheep, Wis. station	49	47	57	42
6. Malt sprouts, sheep, Wis. station	80	34	69	100
7. Cotton seed meal, sheep, Wis. station.	89	0	69	100

FEEDING EXPERIMENT.

Influence of acid and putrefactive food — Brewers' grains.

At the request of Hon. J. K. Brown, Dairy Commissioner of the State, we undertook a series of experiments upon the effect of feeding brewers' grains to milch cows, with special reference to the effect upon the milk when fed in an acid and putrefactive condition.

For this purpose, two Jersey cows, Jem and Meg, were removed from the pasture to the experimental barn on September 16, and after being fed awhile upon hay, were subjected to the feeding of brewers' grains in as large quantities as they could be induced to eat, with the expectation by injudicious feeding to magnify any ill effect of the food, and thus producing recognizable irregularities in the milk yield, milk composition and properties.

The feeding of the grains commenced on Sept. 26, and the record of the condition of the food at variable dates herewith given : —

Sept. 26. Sweet in general, but mouldy at the surface where exposed to the air.

Sept. 29. The grains very mouldy and give off a disagreeable odor.

Sept. 30. The grains alive with maggots in the upper portion ; apparently too hot below for the maggots to exist.

Oct. 2. The grains sour and maggoty.

Oct. 3 The grains more offensive and sour in odor than ever.

Oct. 6. The grains fed to-day were in somewhat sweeter condition than those fed for the past two days, owing to their being dug from down into the box, below the maggots and dry state. They were somewhat acid, rather than sour or mouldy.

Oct. 8. The grains are sour a short distance below the exposed portion, but are otherwise clean and much relished by the cows. That portion exposed to the atmosphere is blackish, dry and maggoty.

Oct. 11. Started in upon a new lot of grains. The grains on the surface very rotten, black and disagreeable, but three inches down were in white condition. The black and the white were fed mixed. Meg does not relish them : Jem does.

Oct. 15. The grains very offensive in odor, caused by a decayed maggoty portion from the surface, that was as usual mixed with the rest.

Oct. 16. The grains very offensive to-day.

Oct. 20. The grains have an odor resembling sauerkraut, very strong.

Oct. 26. The grains no worse in quality than heretofore.

Nov. 1. The grains are offensive in odor when long exposed, as on top of barrel.

Nov. 2. The grains more offensive to-day than at any time since feeding, being putrid in places.

Nov. 3. Grains as yesterday.

We were unable, as it seems, to keep up a continuous grains feeding, without the addition of hay. The idea, however, was kept predominant, of feeding as little hay as possible. Hence the grains were fed in such quantities as the cows would consume, and after the grains were eaten hay was fed in like manner. The first effect of this system was to produce a satiety in the animals, from which they finally recovered, and at last became habituated to quite a regularity in the quantity both of the grains and hay which were consumed. Nine days of hay feeding, as will be observed, preceded and followed the experiment proper, that of the grains, whereby we have opportunity for measuring changes which intervened.

The cows selected had been at pasture during the summer, without grain, and were removed from the pasture at once to the experimental barn.

Jem is about four years old, and had a calf October 24, 1882, and December 20, 1883, was bred March 31 and May 8, and is hence due to calve January 5 or February 11, 1885. She arrived at the station November 30, 1882, and went dry November 24, after yielding 4460 pounds of milk. With her next calf, December 20, 1883, she gave up

to September 16, the beginning of the experiment, 5,472 pounds of milk, upon September 16 yielding seven pounds fifteen ounces. She weighed 569 pounds on arrival November 30, 1882, and 620 pounds April 19, 1882; 701 pounds on January 11, 1884, and 716 pounds September 1, 1884.

Meg is about six years old, and had a calf December 4, 1883, and again January 7, 1884. She was bred April 5, 1884, and is hence due to calve January 9, 1885. She arrived at the station November 30, 1882. From her calving December 4 to her drying off November 24, 1883, she yielded 5552 pounds of milk. Calving again January 7, 1884, she has yielded up to September 16, the date of this experiment 4385 pounds, yielding on September 16, nine pounds six ounces. She weighed 792 pounds on her arrival at the station November 1882, and 676 pounds April 19, 1882; 809 pounds January 11, 1884, and 786 pounds September 1, 1884.

The data obtained are given in the following tables: —

TABLE.

DATE.		Weight of Cows. Lbs.			Weight of Food Consumed Lbs.				Dry Matter.	
					Jem.		Meg.		Consumed. Lbs.	
		Jem.	Meg.	Average.	Hay.	Grains.	Hay.	Grains.	Jem.	Meg.
Sept.	17	716	786	751	31.81	....	83.91	....	27.2	29.0
	18	713	777	745	18.96	....	16.96	....	16.2	14.5
	19	726	801	763	25.72	....	25.12	....	22.0	21.5
	20	718	787	750	23.50	....	23.58	....	20.1	20.1
	21	736	830	783	25.75	....	24.93	....	22.0	21.3
	22	750	820	785	21.81	....	20.58	....	18.3	17.6
	23	746	819	782	28.06	....	27.87	....	24.0	23.8
	24	739	807	772	28.81	....	27.15	....	24.2	23.2
	25	743	821	782	28.93	....	28.56	....	24.8	24.4
	26	752	834	793	15.87	26.12	15.87	26.12	19.2	19.2
	27	736	827	781	9.81	40.16	9.68	40.0	17.7	17.5
	28	754	830	792	6.12	67.0	6.93	67.0	20.8	21.5
Oct.	29	736	818	777	....	92.9	....	56.81	21.4	18.1
	30	725	801	763	....	7.43	....	....	2.0	....
	1	680	769	724	9.72	....	1.10	....	8.3	9.4
	2	678	775	726	....	21.0	....	20.0	4.9	4.7
	3	690	772	731	....	26.0	....	23.0	6.0	5.4
	4	667	766	716	....	25.0	....	11.60	5.8	2.7
	5	651	728	689	...	35.0	2.0	1.41	8.2	2.0
	6	650	726	688	....	25.0	7.25	12.0	5.8	9.0
	7	635	750	692	6.0	25.0	6.0	27.0	11.0	11.5
	8	649	771	710	3.0	30.0	3.0	30.0	9.6	9.6
	9	646	765	705	7.0	30.0	6.0	40.0	13.0	14.5
	10	649	760	704	4.0	25.0	4.0	25.0	9.2	9.2

TABLE. — Continued.

DATE.		Weight of Cows. Lbs.			Weight of Food Consumed. Lbs.				Dry Matter.	
					Jem.		Meg.		Consumed. Lbs.	
		Jem.	Meg.	Average.	Hay.	Grains.	Hay.	Grains.	Jem.	Meg.
Oct.	11	650	755	702	4.0	25.0	4.0	25.0	9.2	9.2
	12	640	748	694	5.0	20.0	5.0	20.0	9.0	9.0
	13	649	747	698	5.0	35.0	5.0	35.0	12.5	12.5
	14	620	722	671	6.0	35.0	6.0	35.0	13.4	13.4
	15	657	759	708	6.0	40.0	6.0	40.0	14.5	14.5
	16	662	768	715	5.0	40.0	5.0	40.0	13.6	13.6
	17	666	757	711	6.0	40.0	6.0	40.0	14.5	14.5
	18	670	768	719	6.0	45.0	6.0	45.0	15.7	15.7
	19	679	755	717	6.0	40.0	6.0	40.0	14.5	14.5
	20	668	748	708	6.0	45.0	6.0	45.0	15.7	15.7
	21	692	765	728	6.0	50.0	6.0	50.0	16.8	16.8
	22	698	771	734	6.0	55.0	6.0	55.0	18.0	18.0
	23	701	770	735	6.0	52.62	6.0	55.0	17.4	18.0
	24	700	775	737	6.0	35.0	6.0	55.0	13.4	18.0
	25	699	782	740	6.0	55.0	6.0	55.0	18.0	18.0
	26	709	793	751	6.0	35.0	6.0	35.0	13.4	18.4
	27	697	775	736	6.0	35.0	6.0	35.0	13.4	13.4
	28	699	784	741	4.0	40.0	4.0	40.0	12.7	12.7
	29	689	765	727	6.0	50.0	6.0	50.0	16.8	16.8
	30	697	777	737	6.0	50.0	6.0	50.0	16.8	16.8
	31	693	775	734	4.0	50.30	4.0	50.0	15.0	15.0
Nov.	1	703	775	739	6.0	18.7	6.0	34.6	9.4	13.2
	2	696	770	733	6.0	35.0	6.0	50.60	13.4	16.8
	3	700	777	738	6.0	37.43	6.0	31.43	13.9	12.5
	4	702	771	736	17.0	....	17.0	...	14.6	14.6
	5	727	788	757	20.0	....	20.0	....	17.1	17.1
	6	737	808	773	20.0	....	20.0	....	17.1	17.1
	7	736	813	774	22.0	....	22.0	....	18.8	18.8
	8	753	811	782	20.0	....	20.0	...	17.1	17.1
	9	750	821	785	20.0	....	20.0	....	17.1	17.1
	10	750	824	787	20.0	....	20.0	....	17.1	17.1
	11	758	829	791	20.0	....	20.0	....	17.1	17.1
	12	750	827	788	25.0	....	25.0	....	21.4	21.4

DATE.		Water.								Milk Yield.				Total.		
		Jem.				Meg.										
		Drank.		In food.		Drank.		In food.		Jem.		Meg.				
		lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.			
Sept.	17	85	8	4	61	65	0	4	9	6	12	9	12	16	8	
	18	88	6	2	74	60	7	2	4	7	15	8	8	16	7	
	19	72	6	3	72	74	0	3	6	7	11	10	11	18	6	
	20	98	7	3	40	120	0	3	4	7	6	10	0	17	6	
	21	89	7	3	73	74	0	3	6	7	5	10	12	18	1	
	22	85	7	3	0	81	5	2	9	8	4	11	5	19	9	
	23	62	6	4	0	63	3	4	0	7	11	11	14	19	9	
	24	109	0	4	1	104	7	3	9	7	7	11	12	19	3	
	25	106	8	4	2	91	4	4	1	8	0	12	6	20	6	
	26	57	0	22	3	66	6	22	3	9	1	12	11	21	12	
	27	77	7	32	1	45	8	32	1	9	0	13	7	22	7	
	28	40	8	52	3	34	7	52	4	10	12	14	13	25	9	
	29	52	5	70	6	25	1	43	2	12	7	15	14	28	5	
	30	27	8	5	4	28	4	0	0	12	4	14	0	26	4	
	Oct.	1	81	0	1	4	39	3	1	6	7	7	6	10	14	1
		2	77	9	16	1	37	5	15	3	5	10	8	4	13	14
		3	24	5	20	0	11	1	17	6	9	0	8	15	17	15
		4	40	9	19	2	12	6	8	9	6	13	7	8	14	5
		5	26	9	26	8	23	0	1	4	5	12	4	8	10	4
		6	18	2	19	2	33	2	10	2	5	11	3	5	9	0
7		31	4	20	0	26	6	21	5	4	7	6	1	10	8	
8		28	3	23	4	10	6	23	4	5	11	8	7	14	2	
9		26	3	24	0	12	2	31	5	5	7	10	13	16	4	
10		28	5	19	8	16	1	19	8	6	8	11	14	18	6	
	11	40	1	19	8	17	5	19	8	6	7	10	12	17	3	
	12	42	2	16	0	21	8	16	0	6	6	10	13	17	3	
	13	43	3	27	5	26	2	27	5	5	5	10	3	15	8	
	14	32	3	27	6	17	3	27	6	5	13	11	8	17	5	
	15	32	2	31	5	17	6	31	5	5	7	10	10	16	1	
	16	42	7	31	4	12	9	31	4	6	8	11	1	17	9	
	17	39	2	31	5	22	9	31	5	6	13	11	1	17	14	
	18	35	0	35	3	5	7	35	3	6	7	11	6	17	18	
	19	9	8	31	5	0	0	31	5	5	14	10	10	16	8	
	20	45	9	35	3	42	6	35	3	4	4	9	13	14	1	
	21	52	3	39	2	26	3	39	2	6	6	11	5	17	11	
	22	41	7	43	0	29	4	43	0	7	3	11	9	18	12	
	23	24	2	41	2	19	8	43	0	7	3	11	7	18	10	
	24	51	2	27	6	23	5	43	0	6	10	11	2	17	12	
	25	40	0	43	0	19	2	43	0	6	8	10	8	17	0	
	26	34	6	27	6	25	8	27	6	6	2	10	7	16	9	
	27	58	1	27	6	21	1	27	6	5	15	9	9	15	8	
	28	41	0	31	3	29	1	31	3	6	4	9	9	15	13	
	29	49	8	39	2	26	7	39	2	5	3	9	2	14	5	
	30	35	4	39	2	26	8	39	2	6	0	9	0	15	0	
	31	18	2	39	0	22	7	39	0	4	13	9	5	14	2	
	Nov.	1	33	4	14	9	26	5	27	4	4	7	8	12	13	3
		2	41	7	27	6	36	6	39	2	4	2	8	2	12	4
		3	39	5	29	5	28	3	24	9	5	1	7	15	13	0
		4	65	6	2	4	53	0	2	4	4	7	6	10	11	1
		5	59	5	2	9	75	4	2	9	4	14	7	0	11	14
		6	59	2	2	9	81	8	2	9	4	7	6	13	11	4
		7	62	8	3	2	48	2	3	2	4	5	6	12	11	1
		8	66	0	2	9	72	9	2	9	4	6	6	14	11	4
		9	57	6	2	9	56	5	2	9	4	4	6	12	11	0
10		69	5	2	9	63	3	2	9	4	2	6	10	10	12	
11	62	0	2	9	59	1	2	9	4	9	6	14	11	7		
12	64	9	3	6	55	0	3	6	4	13	7	0	11	13		

DATE.		Morning's Milk.				Evening's Milk.			
		Jem.		Meg.		Jem.		Meg.	
		Per cent Fat by Analysis.	Per cent Air-dry Butter by Churn.	Per cent Fat by Analysis.	Per cent Air-dry Butter by Churn.	Per cent Fat by Analysis.	Per cent Air-dry Butter by Churn.	Per cent Fat by Analysis.	Per cent Air-dry Butter by Churn.
Sept.	17	6.72	.....	5.45	.....	8.52	.....	6.37	....
	24	7.42	5.60	.....	.....	.....	.....	.....	.....
	25	.....	.....	.....	.....	6.41	5.50	4.78	2.18
	26	4.75	4.80	6.64	1.92	.....	.....	.....	.....
	29	5.37	5.50	4.52	3.90	.....	.....	.....	.....
	30	.....	.....	.....	.....	6.44	4.95	4.38	1.98
Oct.	1	5.00	.....	4.43	.....	.....	.....	.....	.....
	2	6.24	7.92	6.77	7.00	.....	.....	.....	.....
	3	7.17	7.13	5.53	3.63	.....	.....	.....	.....
	4	5.96	6.28	6.32	5.73	.....	.....	.....	.....
	6	6.02	7.78	10.95	8.36	7.87	7.90	12.53	7.97
	7	.....	6.88	7.14	6.03	.....	.....	7.74	.....
	8	5.90	5.85	5.92	3.75	8.58	14.45	.....	.....
	9	7.50	8.00	4.19	2.25	.....	.....	.....	.....
	10	8.00	9.37	3.79	2.92	.....	.....	.....	.....
	11	7.19	.....	3.46	0.0	.....	.....	.....	.....
	13	7.22	6.80	5.23	4.15	.....	.....	.....	.....
	14	6.87	7.87	3.96	2.97	.....	.....	.....	.....
	15	6.06	4.90	2.74	1.80	.....	.....	.....	.....
	16	.....	6.87	4.78	2.82	.....	.....	.....	.....
	17	6.86	5.27	3.75	2.12	.....	.....	.....	.....
	18	5.76	6.70	4.69	3.57	.....	.....	.....	.....
	20	9.03	10.02	4.55	3.53	7.64	7.50	.....	.....
	21	6.45	6.78	4.41	3.37	...	.....	.....	.....
	22	6.60	6.60	4.54	3.37	.....	.....	.....	.....
	23	6.26	6.30	4.44	3.57	...	.....	.....	.....
	24	7.15	5.83	4.08	1.55	.....	.....	.....	.....
	25	6.22	6.02	3.98	2.63	8.11	7.42	4.49	2.65
	27	8.22	8.37	4.91	3.42	8.14	8.13	.....	.....
	28	6.66	6.85	4.42	3.75	.....	...	.....	.....
	29	7.69	7.17	4.36	3.37	.....	.....	.....	.....
	30	7.30	7.25	4.49	3.82	.....	.....	.....	.....
	31	8.18	6.50	4.21	2.60	.....	.....	.....	.....
Nov.	1	8.25	8.10	4.79	4.00	...	.....	4.65	.....
	3	8.12	8.77	5.54	.....	.....	.....	.....	.....
	4	6.75	7.92	4.88	.....	.....	.....	.....	.....
	5	8.44	9.32	5.84	5.90	.....	.....	.....	.....
	6	8.84	9.27	5.07	5.30	8.43	8.60	.....	.....
	7	.....	8.87	5.33	5.15	8.28	8.52	.....	.....
	8	9.64	8.65	4.98	4.62	6.41	8.25	.....	.....
	10	8.54	9.87	5.14	5.40	8.42	8.42	.....	.....
	11	7.42	7.98	5.06	4.80	6.92	.....	.....	.....
	12	7.10	8.20	5.20	5.32	6.90	.....	.....	.....

The analytical data upon which the food is figured is:

	HAY.		BREWERS GRAINS.	
	As fed.	Calculated dry.	As fed.	Calculated dry.
Water	14.53	.....	74.98	.....
Ash	6.30	7.37	.87	3.46
Albuminoid	11.80	13.81	5.18	20.69
Crude fiber	28.22	33.02	3.53	14.11
Nitrogen, free ex.....	35.84	41.93	14.13	56.51
Fat.....	3.31	3.87	1.31	5.23
	100.00	100.00	100.00	100.00

The hay was aftermath, with much clover, and was fine and in excellent condition. The grains as previously noted.

We have two periods of nine days each in which the food was hay *ad libitum*, and these shall serve us for comparison. The figures of these periods are herewith given :

	Sept. 17-25.		Nov. 4-12.	
	Jem.	Meg.	Jem.	Meg.
Weight of cow, lbs.....	731	805	739	810
Weight of hay consumed, lbs.	25.8	25.4	20.4	20.4
Weight of water drunk, lbs...	88.8	81.6	63.0	57.2
Weight of dry food, lbs.....	22.1	21.7	17.5	17.5
Weight of milk, lbs.:.....	7.60	10.78	4.46	6.81

If we divide the period of trial into nine days intervals, we have two periods under hay feed exclusively, and four periods under mostly brewers' grains feeding, one of which, the earliest, can be excluded on account of its transition nature. The figures, however, show as below :

	Daily av'g for the two cows ; lbs. wt.			
	Weight of cows.	Weight of dry food.	Weight of water in food and drink.	Weight of milk.
Sept. 17-25, Hay.....	768	21.9	88.9	9.19
Sept. 29-Oct. 7.....	723	7.3	52.3	8.03
Oct. 8-16.....	701	11.1	51.0	8.31
Oct. 17-25.....	726	16.3	66.7	8.67
Oct. 26-Nov. 3.....	737	14.2	64.8	7.21
Nov. 4-12, Hay.....	774	17.5	63.0	5.63

We have thus our answer very plainly outlined: the *feeding of the brewers' grains was conducive to the flow of milk.*

We observe in our nine days' summary, and still more from the daily figures, that the appetite of the cows varied within large limits, and that there was a difficulty in getting sufficient dry food within them for the purpose of full maintenance or gaining weight; for we observe that the live weight was greater under the hay feeding. It will, therefore, be well to reinvestigate the question of live weight in averages of shorter periods, in order to reduce the daily variations into an average which shall give us by inspection an idea of gain or loss. We will give the figures on live weight for three days' averages:

Average live weight in 3-day periods.			
	Jem. Lbs.	Meg. Lbs.	The two. Lbs.
Sept. 17-19	718	788	753
" 20-22	733	812	772
" 23-25	742	816	779
" 26-28	747	830	788
" 29-Oct. 1.....	714	796	755
Oct. 2-4	678	771	724
" 5-7	645	735	690
" 8-10.....	648	765	706
" 11-13.....	646	750	698
" 14-16.....	646	750	698
" 17-19.....	672	760	716
" 20-22.....	686	761	723
" 23-25.....	700	776	738
" 26-28.....	702	784	743
" 29-31.....	693	772	732
Nov. 1-3	700	774	737
" 4-6	722	789	755
" 7-9	746	815	780
" 10-12.....	751	827	789

An inspection of this table shows us several periods, which may be separated as follows:

PERIOD.	Daily dry food. Lbs.	Average weight per cow. Lbs.	Average milk per cow. Lbs.
I. Gaining, Sept. 17-28.....	21.2	773	9.80
II. Losing, Sept. 29-Oct. 7.....	7.3	723	8.03
III. Even, Oct. 8-16	11.6	701	8.31
IV. Gaining, Oct. 17-Nov. 3.....	15.2	731	7.94
V. Greater gaining, Nov. 4-12...	17.5	775	5.64

We see at once that period II was starvation diet, the natural falling off in milk between the periods considered as even, is about one lb., and yet the milk yield nearly keeps up, while in the other

periods it is more than maintained, *showing the effect of the grains towards increasing the milk flow.*

Before using these figures it is necessary to offer some corrections, which an inspection of our daily data will show at once to be justifiable. We note that the first influence of removal from pasture and a new food was to increase abnormally the amount eaten the first day, while using three days' averages it happens that Sept. 29, a day of large grains consumption, is included in the next period, thus increasing the amount of food eaten in Period II, or the starvation period. That practically, notwithstanding the slight changes in the weights in groups III and IV separately, yet practically the two can be merged. We, hence, have for the purpose of our study, four periods, I and IV under hay feeding, II under starvation diet, and III, from Oct. 8, to Nov. 3, 27 days, as representing the effect of the brewers grains'.

During the first four days of the brewers' grain feeding, or Sept. 26 to 29, we had a period in which a full feed of grains was consumed, and for the purpose of verifying our general conclusions, we can compare this period with the four preceding days on hay; thus :

Average daily per cow :

	Hay.	Consumed. Grains.	Dry Matter.	Weight of cows.	Weight of milk
DATE.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Sept. 22-25	26.3	....	22.4	780	9.83
Sept. 26-29	7.8	51.8	18.6	778	12.96

We see then, that when the cows ate a proper quantity of the grains that the effect on the live weight and on the milk yield was excellent, and that the falling from live weight afterwards may and probably did, arise from the unsavory character of the food which acted upon the appetite of the cows to prevent a full feeding.

We will now present the averages for the four corrected periods, which we shall designate hereafter as A, B, C and D.

	Period A. Sept. 17-29 ull feeding.	Period B. Sept. 30- Oct. 7 Star- vation diet.	Period C. Oct. 8-Nov. 3. Brewers grains.	Period D. Nov. 4-12. Full feed- ing.
DAILY AVERAGE.	Lbs.	Lbs.	Lbs.	Lbs.
Dry matter fed.....	20.9	6.0	14.0	17.5
Weight of cows.....	774	716	722	775
Weight of the cows first- four days.....	752	736	706	760
Weight of the cows last- four days.....	786	697	736	788
Weight of milk	10.13	7.26	8.10	5.64
Weight of albuminoid fed .	3.13	1.09	2.56	2.41
Weight of Carbo-hydrates and fat.....	10.15	3.34	7.88	8.01

Examining this table, we note that there is a constant difference between the average weight of the cows the first and last four days of each period, in all but Period B which was starvation, showing about an equal gain; we note also that the average total weight is larger in Periods A and B under full feeding. These records indicate then, that under Period C a maintenance ration was being fed, while in the Periods A and D a gaining ration.

We must hence come to the conclusion that *the grains are a valuable feeding material for maintenance*, when fed with a small quantity of hay.

For further confirmation we may refer to the first four days, on grains, as compared with the four preceding days on hay, where we find constant weight, with increased milk for the grains, the feeding ration being nearly equivalent; thus:

	Albu- minoid	Fed daily in pounds. Nitrogen, free extract.	Fat.
Sept. 22-25. Hay.....	3.10	9.43	.86
Sept. 26-29. Grains mostly...	3.40	9.57	.88

	Average wt. of cows. Lbs.	Average daily milk yield. Lbs.
Sept. 22-25	780	9.83
Sept. 26-29	778	12.26

The first ration 26.3 lbs. of hay, the second rations 7.8 lbs. of hay, and 51.8 lbs. of brewers' grains.

During Period A 7 partial analyses of the milk were made, the average being 5.70 per cent of fat. During Period B, 16 partial analyses were made, the average being 6.91 per cent of fat, two of which analyses were of phenomenal richness, viz., 10.95 and 12.53 per cent, for the morning and night's milk from Meg. During Period C, 50 partial analyses, and 5.91 the average fat. During Period D, 21 partial analyses, and 6.84 the average fat.

These results can best be shown in tabular form:

	Fat by analysis.		Butter by churn.	
	No of analyses	Per cent fat.	No of churnings.	Per cent air dry butter.
Period A.	7	5.70	7	4.20
Period B.	16	6.91	14	6.39
Period C.	50	5.91	48	5.44
Period D.	21	6.84	19	7.39

These *average* results *do not indicate that the feeding of the brewers' grains was detrimental to the quality of the milk.* It may be well to supplement this table, however, with another, which shall

express the actual amount of fat yielded per day, and butter churned per day from the milk during these periods, assuming that the averages of the analyses represent the true character of the total milk yields :

	Average daily milk yield.	Average daily amount of fat by analysis.	Average daily butter recovered by churn.
	Lbs.	oz's.	oz's.
Period A.	10.13	9.23	6.80
Period B.	7.26	8.02	7.42
Period C.	8.10	7.66	7.05
Period D.	5.64	6.17	6.66
Or			
A and D, Hay ration.	7.88	7.70	6.73
C Brewers' grains.	8.10	7.66	7.05

If, however, the tables of daily analyses be studied, it will be seen that there was a greater variability in the product and yield of the cows during the grains feeding, than during the hay feeding, and this effect of the feed may be as rationally attributed to the putridity as to the specific action of the food. We may recall here that the injudicious feeding of the grains in the beginning exerted an ill effect on the appetite of the cows, but under continued and more careful feeding, the cows recovered, and the tendency was toward continued improvement during the whole of Period C, twenty-seven days.

We are not justified then in assuming that this experimental trial shows definitely against the grains or the putridity even, in respect to the greater variability noted.

In churning the milk of the various periods, it was very noticeable that under the hay feeding, or Periods A and D, the milk churned more quickly, a lower temperature was required, and the butter was in general of a better grain. Our observations, therefore, so far as they go, are in respect to ease of churning unfavorable to the use of grains as a feed for cows whose milk is used for butter production.

In respect to the taste, flavor, and appearance of the milk, and also as regards keeping quality, no difference between the hay feed or the brewers' grains fed milk was noticeable, nor as between the milk from the experimental cows and that yielded by the remaining cows of the herd, except during the starvation days of Period B.

The conclusion must, therefore, be that so far as this trial indicates, brewers' grains are a healthy and valuable food for milch cows, but that allowing them to become putrid is a mistake, as preventing the full feeding of the animal, and thus being counter to economy. The trial also indicates very strongly that the putridity of the feed was neither injurious to the cows, otherwise than as stated, nor injurious to the quality of the milk for human consumption.

PHENOMENAL MILK.

The study of our milk experiments will be found in the report of the chemist. We would, however, call attention to a few abnormal results which have been observed.

We have had three periods since station-work commenced, during which numerous analyses were made. The first included the mixed milk of four cows, two of which were Jem and Meg, whose milk was afterward kept separate. The average and extreme fat determinations are shown in tabular form.

	No. of analyses.	Average fat per cent.	Extremes.
January 2 — February 18, 1883. Four cows.,	47	5.09	4.47— 6.03
January 21 — March 14, 1884. Jem... ..	76	5.27	3.81— 6.57
Meg... ..	40	4.72	3.49— 6.43
September 21 — November 13, 1884. Jem... ..	54	7.42	4.75— 9.64
Meg	48	5.20	2.74—12.53
Total and average...	265	5.57	

We note that the average fat content of the milk of Jem and Meg during the winter months of 1884 was the same as the average for the herd for the winter months of 1883, and that the autumn milk of 1884 was richer than the winter milk. This is in accord with the general observation in practice, that the milk of cows increase in per cent of richness as the period from calving increases, and hence can have but little significance as respects the character of the food fed.

We note, in addition, extreme variations between the fats of the various milkings analyzed. In 1883 this was 1.55 per cent, in the winter of 1884 2.76 and 2.94 per cent, and in the autumn 4.89 and 9.79 per cent. This leads us to the recognition of what we may call phenomenal milk, and, for the purposes of examination into causes, we will take the analyses of Meg's milk, morning and evening, of October 6, 1884 :

	Sp. gravity.	Total fat.	Total solids.
Morning's milk.....	1.0275	10.45	20.01
Evening's milk.....	1.0253	12.53	21.43

The feeding, live-weight of cow, and the daily milk yield for the week preceding was as below :

	Dry wt. of food consumed.	Wt. of water drunk and fed.	Morning wt. of cows.	Daily milk yield.	
	lbs.	lbs.	lbs.	lbs.	oz.
September 30.....	0	28.4	801	14	0
October 1.....	9.4	40.9	769	6	10
2.....	4.7	52.7	775	8	4
3.....	5.4	28.7	772	8	15
4.....	2.7	21.6	766	7	8
5.....	0.4	24.0	728	4	8
6.....	2.8	40.5	726	3	5

The food was brewers' grains, kept predominant, and, after being sated with the grains, which were in a stale and putrefactive condition, hay was fed in such quantities as would be eaten. During the seven days 20.2 pounds of hay and sixty-eight pounds of brewers' grains were consumed, and 236.8 pounds of water drunk, an average per day 2.9 pounds hay, 9.7 pounds of grains, and 33.8 pounds of water, the average daily product in milk 7.5 pounds, the loss in live-weight seventy-five pounds.

But few analyses of the milk were made previously to this starvation period. On September 26th the morning's milk yielded 6.64 per cent of fat, and on September 29th 4.52 per cent. The next analyses of morning's milk commenced October 1st with 4.43 per cent and continued 6.77, 5.53, 6.32, no analyses and 10.95 per cent. The average of forty-eight analyses, under various circumstances, September 17th–November 13th, morning's and evening's milk 5.20 per cent. But one analyses of the evening's milk made prior to the starvation period — this one, September 25th, giving 4.78 per cent. During the starvation period but two analysis were made, one on September 30th of 4.38 per cent, the other the phenomenal milk of October 6th, 12.53 per cent of fat. But on three days outside October 6th was the fat determined in both morning's and evening's milk, and in each case the evening's milk was the richest in fat, the average for the morning's milk being 5.30 per cent, and for the evening's milk 5.63 per cent.

We have thirty-four fat analyses of Meg's morning milk from September 26th to November 12th, exclusive of the starvation period, September 30th to October 6th. Arranging the figures of the starvation period in order of magnitude, we can average the thirty-four analyses in numbers of greater or less, as below:

Fat in morning's milk.
Starvation period.

4.43
5.53
6.32
6.77
10.95

Of thirty-four other analyses.

Eleven under 4.43
Twenty-eight under 5.53
Thirty-two under 6.32
Thirty-three under 6.77
Thirty-four under 10.95

The conclusion is hence undeniable that the milk was richer during the starvation period than at other times.

Under these circumstances it may be suggested plausibly that the fat in the milk was being formed from the stored fat of the body, rather than from the food, and, indeed, this becomes certain when we examine other evidence and find a greater excretion of fat in the milk than the consumed food was capable of supplying.

In our first report we gave an analysis of the mixed milk of three cows just landed from a railroad journey of two days, in which the fat was 10.50 per cent, and which we classed as phenomenal milk from fatigued and harassed cows. In view of this year's results, with Meg under starvation diet, we may believe that it was rather

starvation as a primary factor than fatigue which produced the result noted.

We may infer from this trial that the fat of the body is easier carried into the milk than the fat from the food-supply, and this leads to the practical conclusion that for butter-cows high condition at the time of calving is advantageous, and this idea seems to receive substantiation from the general sentiment current with dairymen.

DUPLICATES.

In plat work, the first thing to consider is the equivalency of duplicates. It is evident that if a greater difference in yield exists between duplicates than occurs between two plats differently treated that the difference in yield cannot, in logic, be a measure of the efficacy of the treatment applied. It is also equally true that if two plats differently treated yield alike, this fact cannot be considered as measuring equivalency when two duplicate plats afford great variation in yield. If this be correct reasoning, it seems essential that we shall have some method whereby we can be assured of the equality of the land as respects its evenness of fertility, and for this purpose the first thought that suggests is that the amount of the preceding crop may serve as a guide. For the purposes of testing the question, certain plats of a likeness in preceding crop were taken for a study, and planted with the same variety of potato, the cutting of the seed, distances of planting, time of planting, and treatment during growth carefully planned to be alike.

D. 18.

1883. 400 lbs. phosphate per acre.
Early Amber Cane.
1131 lbs. forage.

1884. 400 lbs. phosphate per acre.
White Star Potato.
Single eyes.
573 hills grew.

Yield:

Lbs. oz.	
546	8 merchantable.
23	12 unmerchantable.
570	4 Total.

E. 17.

1883. 400 lbs. phosphate per acre.
Early Amber Cane.
1131 lbs. forage.

1884. 400 lbs. phosphate per acre.
White Star Potato.
Single eyes.
434 hills grew.

Yield:

Lbs. oz.	
294	4 merchantable.
38	8 unmerchantable.
332	12 Total.

It may be at first suggested that the number of hills are not alike. Re-calculating, so as to include the missing hills, we have :

	Merch.		Unmerch.		Total.	
	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.
D. 18	546	8	23	12	570	4
E. 17	388	3	50	13	438	0
Difference.....	158	5			132	4

Multiplying by twenty, to get the rate per acre, we note the difference between these supposed duplicate plats to be 52.7 bushels of merchantable, or 44.1 bushels of total crop of potatoes.

In E. 4 and E. 7 we have a still better test :

E. 4.

1882. Sod.

1883. 400 lbs. phosphate per acre.
Ear corn, 235 3-4 lbs.

1884. 400 lbs. phosphate per acre.
White Star Potatoes.
1-4 potatoes as seed.
590 hills grew.

Yield:

Lbs. oz.

678 5 1-2 merchantable.

50 0 1-4 unmerchantable.

 728 5 3-4 Total.

E. 7.

1882. Sod.

1883. 400 lbs. phosphate per acre.
Ear corn, 233 3-4 lbs.

1884. 400 lbs. phosphate per acre.
White Star Potatoes.
1-4 potatoes as seed.
591 hills grew.

Yield:

Lbs. oz.

784 12 1-2 merchantable.

42 8 unmerchantable.

 826 15 1-2 Total.

Multiplying by twenty as before, to get the rate per acre, and we note a difference of 35.5 bushels of merchantable, and 32.8 bushels of total yield between the plats.

In D. 10 and E. 12, we have another instance of apparant duplicates :

D. 10.

1882. Sod.

1883. 400 lbs. phosphate per acre.
Ear corn, 258 lbs.

1884. 400 lbs. phosphate per acre
White Star Potatoes.
Single eyes.
573 hills grew.

Yield:

Lbs. oz.

567 0 merchantable.

30 12 unmerchantable.

 597 12 Total.

E. 12.

1882. Sod.

1883. 400 lbs. phosphate per acre.
Ear corn, 258 lbs.

1884. 400 lbs. phosphate per acre.
White Star Potatoes.
Single eyes.
574 hills grew.

Yield:

Lbs. oz.

610 0 merchantable.

24 4 unmerchantable.

 634 4 Total.

Multiplying by twenty, as before, to obtain the rate per acre, and we find the difference of yield between the plats 14.3 bushels of merchantable, or twelve bushels in total yields.

In these carefully arranged duplicate plats we note no duplicate yields ; thus, per acre :

				Difference.	
	Merch. bush.	Total. bush.		Merch. bush.	Total. bush.
D. 18.....	182.1	190.1	E. 17.....	98.1	110.9
E. 4.....	226.1	242.8	E. 7.....	261.6	275.6
E. 10.....	189.0	190.2	E. 12.....	203.3	211.2
				84.0	79.2
				35.5	32.8
				14.3	12 0

It is quite evident, therefore, that for potatoes, the equivalency of the preceding crops as given by our tables is no indication of equivalency in the crops harvested the present year.

In D. 13 and D. 14 we might be supposed to have duplicates in 1884, as in 1882 the crop was mixed cow-peas broadcasted and plowed under, in 1883 the same, with the addition of 400 pounds phosphate per acre. In 1884 single eyes were planted, cut from the seed half and the stem half of the potato, 400 pounds of phosphate per acre applied, and treatment in other respects alike. As we have shown elsewhere, potatoes cut in this manner may be considered as equivalents. The yield was, in pounds :

	No. hills.	Merch. Lbs.	Unmerch. Lbs.	Total. Lbs.
D. 13	539	515.25	18.25	533.5
D. 14	556	585.0	28.25	613.25
• Difference	17	69.75	10.0	79.75
		Bush.	Bush.	Bush.
Per acre		23.2	3.3	26.5

Correcting to even number of hills, we have :

	Hills.	Merch. Lbs.	Unmerch. Lbs.	Total. Lbs.
D. 13	556	530.8	19.4	550.2
D. 14	556	585.0	28.25	613.25
Difference		54.2	8.85	63.05
		Bush.	Bush.	Bush.
Per acre		18.0	2.9	21.0

We have here, per acre, the difference between the actual and calculated differences, or five bushels of merchantable, or five and one-half bushels total, which may be ascribed to difference in number of plants, while there remains a difference of eighteen or twenty-one bushels to destroy the appearance of equal fertility of the land.

In D. 2 and D. 4 we have duplicates, apparently, in 1883; let us examine the records :

1882. No fertilizer. Corn, in hills, five by five feet. Product not weighed.

1883. Four hundred pounds phosphate per acre; 198 pounds sound corn on each plat.

1884. Four hundred pounds phosphate per acre. White Star potatoes, single eyes, two together in a hill; hills twelve inches by forty-four inches; 602 hills vegetated in both plats, or—

D. 2.

1882. Corn. No fertilizer.

1883. 400 lbs. phosphate per acre.
Ear corn, 198 lbs.

1884. 400 lbs. phosphate per acre.
White Star Potatoes.
Single eyes, 2 to a hill.
Hills 12 x 44 inches.
602 hills grew.

Yield:

Lbs.	oz.
331	3 merchantable.
84	13 unmerchantable
<hr/> 416	<hr/> 0 Total.

D. 4.

1882. Corn. No fertilizer.

1883. 400 lbs. phosphate per acre.
Ear corn, 198 lbs.

1884. 400 lbs. phosphate per acre.
White Star Potatoes.
Single eyes, 2 to a hill.
Hills 12 x 44 inches.
602 hills grew.

Yield:

Lbs.	oz.
584	8 merchantable.
42	0 unmerchantable.
<hr/> 626	<hr/> 8 Total.

The difference here, 253.3 pounds merchantable, or 210.5 pounds total, or calculated to the acre, 84.4 bushels and 70.1 bushels.

This presentation must convince the most skeptical that the interpretation of plat work in the ordinary manner is subject to errors, errors which, in the system of comparisons in use, scarcely admit of detection, and yet which, if we attempt to generalize from our conclusions, must certainly lead us astray, or leave our conclusions open to doubt.

It may well be asked, if the present system tends to lead astray, what system should be substituted? We candidly admit that we are not yet prepared to speak authoritatively to meet the views of those to whom the specious conclusions of the present system are so attractive. We believe there is a gain in recognizing an error, even if we cannot remove it, just as it is a gain to locate a rock upon a chart, even if the rock cannot be removed.

Let us, however, examine our cases under the supposition that increased length and decreased breadth of our plats will tend to eliminate some differences. In certain plats of the D and E series we have duplicate plantings of White Star potatoes under duplicate numbers, and we may compare the twentieth acres as all D and all E, or as two halves of D and E numbers combined, in the one case our plats being 2 x 4 rods, in the other 1 x 8 rods.

	2 x 4 Rods.		1 x 8 Rods.	
	Merch.	Total.	Merch.	Total.
D. 12.....	632.5	659.7	630.9	654.7
E. 12.....	610.0	634.2	611.6	638.7
Difference.....	22.5	25.5	19.3	16.0
D. 13.....	515.2	533.5	535.5	556.2
E. 13.....	542.2	565.7	522.0	543.0
Difference.....	27.0	32.2	13.5	13.2
D. 14.....	585.0	613.2	579.2	609.6
E. 14.....	572.4	601.8	578.0	605.6
Difference.....	12.6	11.4	1.2	4.0
D. 17.....	343.5	392.7	300.7	346.4
E. 17.....	294.2	332.7	337.0	379.1
Difference.....	49.3	60.0	36.3	32.7
D. 18.....	546.5	570.2	581.9	612.2
E. 18.....	539.2	575.5	503.9	533.5
Difference.....	7.3	5.3	78.0	78.7
D. 19.....	373.2	414.0	381.5	422.5
E. 19.....	307.0	349.2	298.7	340.7
Difference.....	66.2	64.8	82.8	81.8

The average difference :

	Merch.	Total.
2 x 4 plats.....	30.8 lbs.	33.2 lbs.
1 x 8 plats.....	38.5 lbs.	37.7 lbs.

The 1 x 8 plats a less difference than the 2 x 4 plats in four cases out of the six.

In two of the Waushakum corn series, I. A. and II. A., we have ten full plats of one-tenth acre of corn, which can in like manner be calculated as twentieth plats 2 x 4 and 1 x 8 rods sides, each tenth being under equivalent conditions.

	Calculated 2 x 4 rods sound corn.	Calculated 1 x 8 rods sound corn.
I. A. 1.....	223.9 lbs. 206.5 lbs.	204.6 lbs. 225.9 lbs.
Difference.....	17.4 lbs.	21.3 lbs.

	Calculated 2 x 4 rods sound corn.	Calculated 1 x 8 rods sound corn.
I. A. 2.....	225.1 lbs. 202.3 lbs.	214.4 lbs. 213.0 lbs.
Difference.....	22.8 lbs.	1.4 lbs.
I. A. 3.....	201.9 lbs. 218.0 lbs.	207.4 lbs. 212.4 lbs.
Difference.....	16.1 lbs.	5.0 lbs.
I. A. 4.....	224.7 lbs. 247.0 lbs.	236.6 lbs. 235.2 lbs.
Difference.....	22.3 lbs.	1.4 lbs.
I. A. 5.....	218.5 lbs. 238.6 lbs.	222.5 lbs. 233.3 lbs.
Difference.....	20.1 lbs.	10.8 lbs.
II. A. 1.....	211.9 lbs. 196.5 lbs.	193.1 lbs. 205.3 lbs.
Difference.....	15.4 lbs.	12.2 lbs.
II. A. 2.....	211.6 lbs. 234.7 lbs.	224.4 lbs. 221.8 lbs.
Difference.....	23.1 lbs.	2.6 lbs.
II. A. 3.....	231.6 lbs. 234.1 lbs.	230.8 lbs. 234.9 lbs.
Difference.....	2.5 lbs.	4.1 lbs.
II. A. 4.....	221.4 lbs. 230.1 lbs.	215.5 lbs. 236.1 lbs.
Difference.....	8.7 lbs.	20.6 lbs.
II. A. 5.....	215.6 lbs. 241.0 lbs.	229.1 lbs. 227.4 lbs.
Difference.....	25.4 lbs.	1.7 lbs.

In these ten series the difference is less in 1 x 8 rods calculation in seven cases out of the ten, while the average difference is —

For the 2 x 4 calculations..... 17.4 lbs. per plat.
“ 1 x 8 calculation 8.1 “ “

As in the two cases of the potatoes and corn, we have less difference in the long-row calculation in eleven cases out of sixteen, we are justified in thinking that plats should be laid out long and narrow in preference to a square area, but our data is scarcely sufficient for us to foresee how long the plats should be in order that two adjoining plats shall attain to be duplicates of each other, under duplicated conditions.

In all our calculations upon the efficiency of methods in our plat series we are subjected to the liability of error through not having any standard for the purposes of estimating the value of the variations in crop noted. Yet the discussing of our results may afford some clew to practice, if interpreted in terms of greater or less, but we must guard against using the figures as representing absolute quantities, either by themselves or relatively to others with which they may stand in seeming comparison.

POTATOES.

The first question to be asked with potatoes is that of the influence of the seed used, and we put it into the form of a query:

What is the influence of position of the eye of the potato as regards crop? This question derives an importance from the quite general habit among farmers of rejecting the seed end of the potato for planting. For the purposes of the trial, Plats D. 7 and D. 10, each of one-twentieth of an acre, were taken, fertilized at the rate of 400 pounds superphosphates per acre, and planted with the single eyes in order as cut from the tuber. The same trial in 1883, with Plat C. 5, was as nearly as possible under identical conditions of method and treatment, and hence its results may be again presented here. The data obtained was:

Plat.	No. of potatoes.	No. of eyes planted.	No. of eyes grew.	No. of eyes failed.	Yield merchant-able.	Total yield.
C. 5, 1883.....	30	581	557	25	388.7 lbs.	667.6
D. 7, 1884.....	28	583	549	34	524.1 lbs.	568.5
D. 10, 1884	28	581	573	8	316.1 lbs.	379.1

Yield per 100 eyes or hills, in pounds:

	C. 5, 1883.				D. 7, 1884.			D. 10, 1884.		
	Merch.	Unmerch.	Rotten.	Total.	Merch.	Unmerch.	Total.	Merch.	Unmerch.	Total.
Stem eyes.....	62.18	15.48	26.81	104.47	84.50	7.75	92.25	55.11	10.79	65.90
Central eyes.....	72.88	15.23	43.05	131.16	111.20	8.71	119.91	65.61	11.94	77.55
Terminal eyes....	73.73	15.72	33.41	142.86	88.67	7.88	96.55	43.96	9.88	53.84
The four terminal.	82.55	20.33	40.32	143.20	85.92	9.41	95.33	37.09	9.63	46.72

We said in last year's report, in discussing the figures of C. 5, "The lesson taught from these tables is that there is certainly no inferiority of the seed end when used for seed," etc. Interpreting in like manner the figures for this year, as obtained from D. 7 and D. 10, we may say "The lesson taught from these tables is that there is certainly an inferiority of the seed end when used for seed." Whence, then, this apparent contradiction? We believe it proper to confess that we have a greater confidence in our facts than in our interpretation, and in view of the apparent contradiction we can but surmise that our facts last year were discussed in an erroneous manner. We will, therefore, re-investigate our figures of last year; as, however, the number of eyes in each potato are not equally divisible by three we must interpolate in order to secure uniformity, and hence our figures are not exactly the same as those given in last year's report; the figures are also changed relatively by counting the zeros of the missing hills in calculating the crop.

Our calculations, therefore, founded upon the data of the two years, take this form for the total crop —

Total yield for the butt, central and terminal eyes, in pounds, calculated to the 100 eyes —

Plat.	No. of eyes.	Butt.	Central.	Tip.	Butt.	Central.	Tip.
576, C.	5.....	167.6	300.4	272.7	87.3	156.4	142.0
528, D.	7.....	162.5	211.0	169.9	92.2	119.9	96.5
549, D.	10.....	119.9	141.7	98.0	65.9	77.5	53.8

	C. 5, per cent.	D. 7, per cent.	D. 10, per cent.
The butt eyes yielded in per cent of total yield....	23	30	33
The central eyes yielded in per cent of total yield..	40	39	39
The tip eyes yielded in per cent of total yield.....	36	31	28

We may again figure out the actual results in another form —

	C. 5.	D. 7.	D. 10.	Total.
The butts were ahead of the centers.....	2 times.	2 times.	6 times.	10 times.
The tips were ahead of the centers	9 "	4 "	4 "	17 "
The centers were ahead of the butts.....	28 "	26 "	22 "	76 "
The centers were ahead of the tips.....	21 "	24 "	24 "	69 "
The tips were ahead of the butts.....	22 "	15 "	7 "	44 "
The butts were ahead of the tips.	8 "	13 "	21 "	42 "

We must, therefore, reverse our statement of last year, and say that the two years' data go to show that the central eyes of the potato are superior in yield to the stem or butt eyes.

When a potato is cut into halves, and the butt end and tip end are used as seed, we should scarcely expect to find much difference, as the errors incident to the plat system may more than counterbalance such differences as exist. In some plat trials we obtained on twentieths of an acre —

	Stem or butt half.			
	Merch.	Unmerch.	Total.	
	lbs.	lbs.	lbs.	ozs.
D. 12.....	632	26	659	8
D. 14.....	585	28	613	0

	Seed or tip half.			
	Merch. lbs. ozs.	Unmerch. lbs. ozs.	Total. lbs. ozs.	
D. 11.....	537 12	17 0	554 12	
D. 13.....	515 4	18 4	553 8	

The average of the two plats of each calculated to the acre of full hills reads —

	Merch.	Unmerch.	Total.
Stem or butt half.....	217.1 bush.	9.9 bush.	227.0 bush.
Seed or tip half.....	185.1 "	6.2 "	191.3 "
Difference.....	32 bush.	3.7 bush.	35.7 bush.

Yet this difference is no more than is often found between duplicate plats, and yet it is about double what occurs between plats D. 12 and D. 14, and still more than exists between plats D. 11 and D. 13.

In the three plats in which the eyes were planted in order the yield, separating the seed into butt half and tip half, was for the total:

Total yield per acre:

	Stem or butt half.	Seed or tip half.
C. 5.....	218.4 bush.	290.8 bush.
D. 7.....	200.9 "	207.6 "
D. 10.....	137.5 "	121.8 "

Massing these with our other results and we have five trials, of which three are in favor of the stem end, and two of the butt end, or in total yield of the five trials the seed end is slightly in advance. We may hence conclude that the trial does not decide a difference between the values of the two ends of the potato as used for seed, but simply determines in terms of greater or less that the central portion of the potato yielded the best results when used for seed.

The next problem we shall seek to elucidate is that of the *influence of the character of the seed used*, understanding by this, single eyes, small cuttings or whole potatoes. As we have already observed, we have no means of determining duplicates, and hence we must devise other methods for obtaining our results than that of the comparison of adjoining crops, which vary from each other no more than do those plats which were intended as duplicates.

For the purposes of our study we have twenty plats where single eyes were used for seed, eight plats with quarter potatoes, five with half potatoes and three with whole potatoes. In every case the fertilization of the preceding year was the same, viz.; 400 pounds superphosphate per acre. In all but a few cases the method of treatment during growth was the same, and the variety in all cases the White Star. In a few cases three kinds of seed were grown in alternate

rows, and the product multiplied by three in order to obtain the yield per twentieth of an acre.

The yields were as below per twentieth of an acre plat, in pounds:
Single eyes used as seed :

	Merch.	Total.	Corrected to 594 hills per plant.	
	Lbs.	Lbs.	Merch. Lbs.	Total. Lbs.
D. 1.....:	294.9	330.7	301.7	338.5
D. 3.....	436.0	468.7	443.5	475.8
D. 11.....	537.7	554.7	559.4	576.1
D. 12.....	632.5	659.2	659.0	687.0
D. 13.....	515.2	533.5	567.8	587.8
D. 14.....	585.0	613.2	624.9	655.1
D. 17.....	343.5	392.7	379.9	433.1
D. 18.....	546.5	570.2	566.0	591.0
D. 19.....	373.2	414.0	388.0	430.6
E. 7.....	528.7	611.1	534.0	556.5
E. 8.....	450.7	491.9	459.7	502.0
E. 9.....	495.7	529.4	508.4	542.9
E. 10.....	567.0	597.7	558.0	619.5
E. 11.....	639.2	670.2	665.0	696.7
E. 12.....	610.0	634.2	631.2	656.4
E. 13.....	542.2	565.7	554.3	577.3
E. 14.....	572.2	601.5	594.5	625.4
E. 17.....	294.2	332.7	402.7	455.3
E. 18.....	539.2	575.5	564.9	602.9
E. 19.....	307.0	349.2	346.6	394.4
Average	490.5	524.8	515.4	550.2
Quarter potatoes used as seed :				
D. 16.....	566.5	632.5	568.4	634.6
E. 1.....	456.3	551.6	507.5	613.6
E. 4.....	678.3	728.5	682.8	733.5
E. 7.....	784.7	827.0	788.3	831.2
E. 8.....	657.0	705.0	663.7	712.1
E. 9.....	690.7	744.0	694.3	747.7
E. 15.....	806.7	853.5	812.2	859.2
E. 16.....	782.7	823.2	785.3	826.0
Average.....	677.8	733.1	687.8	744.7
Half potatoes used as seed :				
E. 2.....	617.7	688.0	620.8	691.5
E. 5.....	785.1	854.7	790.5	860.5
E. 7.....	982.4	1064.6	982.4	1064.6
E. 8.....	846.0	920.2	846.0	920.2
E. 9.....	961.5	1047.7	961.5	1047.7
Average	838.5	915.0	840.2	916.9

Whole potatoes used as seed :

	Merch. Lbs.	Total. Lbs.	Corrected to 594 hills per plat. Merch. Lbs.	Total. Lbs.
E. 3.....	777.0	817.7	780.9	880.0
E. 6.....	910.3	1051.8	911.8	1053.5
E. 10.....	1187.2	1338.0	1193.2	1344.8
Average	958.1	1089.1	961.9	1092.8

We have then for the averages of the plats :

Seed used.	As harvested. Merch. Lbs.	Total. Lbs.	Calculated to 594 hills. Merch. Lbs.	Total. Lbs.
Single eyes	490.5	524.8	515.4	550.2
Quarter potatoes	677.8	733.1	687.8	744.7
Half potatoes.....	838.5	915.0	840.2	916.9
Whole potatoes	958.1	1089.1	961.9	1092.8

As there was no rot this year, the difference between the merchantable and total represents the small potatoes. These on the average were :

	As harvested. Lbs.	per ct.	Calculated to 594 hills Lbs.	per ct.
In single eyes.....	34.3	or 6.5	34.8	or 6.7
In quarter potatoes.....	55.3	or 7.5	56.9	or 7.6
In half potatoes.....	76.5	or 8.3	76.7	or 8.3
In whole potatoes	131.0	or 12.0	130.9	or 12.0

That the single eyes were inferior in yield is best shown by arranging the various plats in order of yield, and placing the various seedings in adjoining columns. This we do, and the answer given by inspection of the table is conclusive as to results in the station plats this year. Our figures are calculated to the acre of 11,880 hills.

Merchantable crop : bushel per acre ; arranged in order of amount of yield :

Seed. Single eyes.	Seed. Quarter potatoes.	Seed. Half potatoes.	Seed. Whole potatoes.
100	169	206	260
115	189	263	303
126	221	282	397
129	227	321	
134	231	327	
147	261		
153	262		
169	270		
178			
184			
186			
186			
188			
188			
189			
198			
208			
210			
219			
221			

We have a few studies in relation to *distance for planting*, but unfortunately too few for a full discussion. We heard last year a theory advanced, and indeed saw it put into practice, that in close planting shading produced the injury often noticed, and that when shading was prevented by pulling off the shoots so as to have but one in a hill, a certain crowding did not show ill effects; and that to secure the full benefits from single eye planting, close planting and a thinning to one stalk, when the plant was a few inches high, was requisite.

In D. 5 we have a twentieth acre, White Star potato, single eyes, used as seed, 12x22 inches spaces and thinned to one stalk to the eye, and in D. 8 another plat where the spacing was the same, but the stalks not thinned. Each plat had received at the rate of 400 lbs. fertilizer per acre :

	Merch. Lbs.	Total. Lbs.	Calculated to full plat. Merch. Lbs.	Total. Lbs.
D. 5 thinned.....	830.5	920.7	859.4	953.1
D. 8 not thinned	577.0	676.5	593.4	695.8
Difference	253.5	244.2	266.0	257.3
Bushel per acre	84.5	81.4	88.6	85.9

In the twenty plats of single eyes, twelve by forty-four inch spaces, same fertilizer employed :

	Actual.		Calculated to full plats.	
	Merch. Lbs.	Total Lbs.	Merch. Lbs.	Total Lbs.
Average yield.....	490.5	524.8	515.4	550.2
Least yield	294.8	330.7	301.7	338.5
Greatest yield.....	639.2	670.2	665.0	696.7

We note that the yield of D 8 is above the average for the plats, and not equal to the best plat, we may, therefore, surmise that the lessened distance of planting was an advantage. As the yield of D 5 was decidedly larger than that of D 8, and was far superior in yield to the best of the twenty single eye plats, we must consider the experiment as indicating an advantage from this method of treatment.

In D 6 we had similar seed, and similar conditions to the above named throughout, with the exception of two single eyes in a hill, and thinned; while D 9, its intended duplicate, was treated the same in all but the thinning.

Two eyes in a hill:

	Actual yield.		Corrected yield.	
	Merch. Lbs.	Total Lbs.	Merch. Lbs.	Total Lbs.
D 6 thinned, 12 x 22 in. spaces....	967.2	1082.6	967.2	1082.6
D 9 not thinned, 12 x 22 in. spaces.	322.4	570.6	326.4	577.4
Difference	644.8	512.0	640.8	505.2
Bushels per acre.....	214.9	170.6	213.6	168.4

In this experiment we see the ill effect of crowding in D 9, by the increase of the unmerchantable potatoes, these being over forty-three per cent of the total crop, instead of the usual six to seven per cent of the single eyes. In D 6 the small potatoes are but ten per cent, and the crop greatly increased.

We are thus justified in giving some countenance to the idea that we may expect, through thinning our plants to a single stalk, to gain increase of crop from single eyes by close planting.

MULCHED POTATOES.

In 1882, through a series of experiments on a quite small scale, the hypothesis was suggested that the potato, for its best crop, requires the tubers to occupy a dry and warm position, and the roots a cool and moist position. A small area was covered with six inches of sand, another with four inches, the potato seed being laid on the ground previous to the covering. Under these circumstances the tubers were formed in the dry and hot sand bed while the roots occupied the moist, because mulched, soil below. The yield was,

	Merch. tubers.	Small tubers.
12 hills, 6 inch sand cover	22 $\frac{1}{4}$ lbs.	$\frac{1}{4}$ ozs.
12 hills, 4 inch sand cover	22 lbs.	10 $\frac{3}{8}$ ozs.
12 hills, ridge culture	9 $\frac{1}{4}$ lbs.	$\frac{3}{4}$ ozs.
12 hills, level culture.....	5 $\frac{3}{4}$ lbs.	1 lb. 11 ozs.

This method of sand covering is not a practicable one for the farmers, but we can secure the same conditions to a certain degree by planting our potatoes upon ridges, and mulching the intervals with straw. In order not to favor the mulched plats, one plan since 1882 has been to allow the straw to replace all cultivation, and such weeds as have appeared have been allowed to grow in every case. In a trial in 1882 the mulched potatoes yielded per 100 hills 92½ lbs. merchantable, and 22½ lbs. unmerchantable tubers. Ordinary ridge culture yielded per 100 hills 83½ lbs. merchantable and 7½ lbs. unmerchantable. The soil of this year's trial was in poor condition.

In 1883, we had seven trials of this method, upon areas of one-twentieth of an acre. In no one case did the mulched plats yield the larger crop, and in some cases very manifestly inferior crop. The average figures obtained were :

	Merchantable tubers.
Seven mulched plats, average yield	363 lbs.
Seven unmulched plats, average yield	520 lbs.

This trial we deem inconclusive, as on account of the moistness of the season we did not secure the theoretical conditions designed, viz.: dry and warm soil for the tubers; cool and moist soil for the roots.

In 1884 we had five trials upon ten plats of one-twentieth acre each. The resulting figures were from the single eyes used as seed, and 400 lbs. phosphate per acre, as below :

Single eyes.	Merch.	Total.
IV. B. mulched intervals	524.4 lbs.	547.4 lbs.
unmulched	458.7 lbs.	477.5 lbs.
V. B. mulched intervals	490.6 lbs.	509.2 lbs.
unmulched	529.5 lbs.	546.7 lbs.
VII. B. mulched intervals	321.5 lbs.	361.5 lbs.
unmulched	405.0 lbs.	429.2 lbs.

Quarter potatoes.		
D 15 mulched	833.2 lbs.	883.2 lbs.
D 16 unmulched	566.5 lbs.	632.5 lbs.
E 16 mulched	782.7 lbs.	823.2 lbs.
E 15 unmulched	806.7 lbs.	853.5 lbs.
Average of the 5 mulched plats	590.5 lbs.	624.9 lbs.
5 unmulched plats	553.3 lbs.	587.9 lbs.

The variation between the extreme yields for the mulched is quite large. This may be allowed for by considering that the plats form two groups, occupying different portions of the field, the B series forming one and the D and E series forming the other, and the seed used single eyes in the one case and quarter potatoes in the

other. Let us arrange our results in order of crop in the two sets of trials :

Single eyes as seed :

	Mulched.			Unmulched.	
	Merch.	Total.		Merch.	Total.
	Lbs.	Lbs.		Lbs.	Lbs.
VII. B.....	321.5	361.5	VII. B.....	405.0	429.2
V. B.....	490.6	509.2	IV. B.....	458.7	477.5
IV. B.....	524.4	547.4	V. B.....	529.5	546.7

As the variation between the extremes of these figures are no greater than occurred in our designed duplicates D 18 and E 17, as heretofore discussed, these series may be considered as duplicates and we note that the mulched plats were superior in crop two out of the three times, but the average yield of the mulched was 445.5 lbs. of the unmulched 464.4 lbs., or as near a duplicate yield as could be expected, the figures, however, slightly against the mulching.

In D and E series we have duplicates again. The yield in order of size was,

Quarter potatoes used as seed :

	Mulched.			Unmulched.	
	Merch.	Total.		Merch.	Total.
	Lbs.	Lbs.		Lbs.	Lbs.
E 16.....	782.7	823.2	D 16	566.5	632.5
D 15.....	833.2	.....	E 15	806.7	853.5

We have in this series the mulched plats the better both trials, as also better results upon the average, there being an average yield of 807.9 pounds merchantable from the mulched plats, and 686.6 pounds merchantable from the unmulched. Yet the difference is no greater than between designed duplicates, and hence cannot be considered as decisive.

As all the seed did not furnish plants we append a corrected table, calculated to an even plant of 594 hills per plat, whereby it will be seen that the correction does not change our conclusions.

Yield corrected to 594 hills per plat, single eye series :

	Mulched.			Unmulched.	
	Merch.	Total.		Merch.	Total.
	Lbs.	Lbs.		Lbs.	Lbs.
VII. B.....	316.1	360.3	VII. B.....	430.2	455.7
V. B.....	521.3	541.0	IV. B.....	465.7	484.8
IV. B.....	573.3	599.4	V. B.....	576.0	594.7

Quarter potato series :

E 16.....	785.3	825.9	D 16.....	568.4	634.6
D 16.....	843.1	893.7	E 15	812.1	859.2

The correct and actual average for the two series is,

	Mulched.		Unmulched.	
	Merch.	Total.	Merch.	Total.
	Lbs.	Lbs.	Lbs.	Lbs.
For the single eye plats, corrected.....	470.2	500.2	490.6	511.7
For the single eye plats, actual.	445.5	472.7	464.4	484.4
For the quarter potato plats, corrected.....	814.2	859.8	690.2	746.9
For the quarter potato plats, actual.....	807.9	853.2	686.6	743.0

It may be well to add in explanation that in order to make our trials as little favorable as possible to the mulching, the straw was applied to the intervals, as soon as the potatoes were sufficiently grown to distinguish the rows, or when all of the hills were supposed to have vegetated. From this time out the plats were uninterfered with, and not only many weeds grew upon the ridges, but there was in many places an abundance of weeds growing out of the straw, these latter coming from the wheat and oat grains which had escaped the thrasher. The unmulched plats were hoed and cultivated sufficiently often to keep in good condition and free from weeds.

It is desirable that this hypothesis regarding the potato be further experimented upon, for, if further trial shall satisfy of the correctness of the idea, we have a reason offered for explaining the benefits derived from stirring the soil about the crop during growth, the pulverized soil acting as a mulch, and answering the same purpose as the straw so far as concerns the lower layers of the soil which are occupied by the feeding roots.

In E 20 we have a plat planted with quarter potatoes, and designed as duplicate with D and E 15 and 16 plats, with the exception that the seed was laid upon the ground and the whole plat covered six inches, more or less, with straw. The yield of E 20, in comparison with D and E. 15 and 16, is given below :

	Merch.	Total.
	Lbs.	Lbs.
E 20. Mulched with straw	372.8	438.0
D 15, E 16. Intervals mulched.....	807.9	853.2
E 15, D 16. Unmulched.....	686.6	743.0

These figures, as far as they go, tend to conform to the hypothesis as is readily seen by inspection. It is hence safe to recommend what experiment shows and what experience confirms, that the farmer should cultivate his crop, either with hoe or horse implement, shallow but frequently during the season, as thus not only are weeds removed, which in themselves are detrimental to crop, but the conditions which seem to be required for a full crop are more nearly secured. For be it remembered that our Lysimeter results, given elsewhere, show that a pulverized upper surface retards evaporation and maintains a greater moisture in the soil underneath than occurs when the surface is allowed to remain hard and firm.

. INFLUENCE OF SHADE ON THE POTATO PLANT.

In order to study the effect of shade upon the potato plant we have two plats, C 17 and O 18, planted in alternate rows with Wausha-

kum corn and White Star potatoes, the corn in hills 42x31 inches, the potatoes in hills 12x31 inches, and the treatment of both plats alike, 400 lbs. of superphosphate per acre being used on either. The yields were :

		Yield.					
		Corn.		Potatoes.		Total.	
		Sound.	Unsound.	Merch.	Unmerch.		
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
No. rows.							
Corn.	Potatoes.						
C 17 ..	6	7	107.0	13.9	109.2	25.7	135.0
C 18 ..	7	6	143.2	18.0	47.5	11.7	59.2

The full stand of corn should have been seventy-six plants to the row, of potatoes sixty-six hills to the row. Correcting for the deficiencies and calculating to the plat of nine rows, we have

Corrected yield.						
		Corn.		Potatoes.		
		Sound.	Unsound.	Merch.	Unmerch.	Total.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
C 17	.....	181.2	23.4	320.7	76.0	396.7
C 18	.....	248.6	25.4	190.6	47.0	237.6

The eight corn plats, which may be considered duplicates, yielded per plat 200.7 lbs. sound and 6.6 lbs. unsound corn, the extremes for sound corn being 161.1 lbs. and 237.0 lbs.

The twenty potato plants, which may be considered as duplicates, yielded in the average 490.5 lbs. merch. and 524.8 lbs. total per plat. The extreme yields of the plats were 294.9 lbs. and 639.2 lbs. for merchantable, 330.7 and 670.2 lbs. for total crop.

We may now compare our figures arranged in tabular form :

Yield.				
	Sound corn.	Potatoes.		Total.
		Merch.	Unmerch.	
	Lbs.	Lbs.	Lbs.	Lbs.
Corn and potatoes, 2 plats, average.....	214.9	255.6	61.5	317.1
Corn, average of 8 plats	200.7	.....	.....	.....
Potatoes, average of 20 plats.....	.....	490.5	34.8	524.8

The extreme yields :

	Sound corn.	Potatoes.		Total.
	Merch.	Merch.	Unmerch.	
	Lbs.	Lbs.	Lbs.	Lbs.
Corn and potatoes, per plat.....	181 and 248	190 and 320	47 and 76	237 and 396
Corn, 8 plats, per plat	161 and 237	.....	.....	.....
Potatoes, 20 plats, per plat.....	.....	295 and 639	31 and 36	330 and 670

We thus see that in the mixed plats the corn yielded more than the duplicate plats, the potatoes less. Even if we make ample allowance in our mind for the increased spacing, we can see no evidence that the potatoes were injurious to the yield of the corn. On the contrary the potatoes seem to be injured greatly by the corn, and this is shown by the great increase in the percentage of unmerchantable potatoes to the merchantable crop. As the corn plant and

the potato plant feed principally from different areas of the soil, we can scarcely believe that the two crops interfered much with each other so far as robbing each the other of fertility is concerned, and as the corn plants bore normal yield and were not shaded, so the potato plants bore small crop and were shaded. Hence we suspect that the shading was the principal cause at work to the detriment of the potato seeding.

Corroborative evidence toward this conclusion is offered by plats D 5, 6, 8 and 9, when the effect of thinning the young plants to one stalk to an eye is discussed.

HYGROSCOPIC PROPERTIES OF GRAIN.

Clawson Wheat.

In the following experiment the grain was put into netting bags and suspended from the ceiling in the laboratory. Clawson wheat, harvested July 16, threshed out July 18, four bags containing 1000 grammes and two bags containing 500 grammes each :

	Grammes	Per cent of loss by drying.
Total weight July 18	5000.0	.....
July 27	4310.4	13.80
August 3.....	4133.5	17.33
August 10.....	4070.7	18.59
August 17.....	4021.3	19.58
August 24.....	3969.2	20.62
August 31.....	4001.5	19.97
September 14	3983.8	20.33
September 21	3980.8	20.39
September 28	4023.2	19.54
October 5	4051.8	18.97
October 12	4026.3	19.48
November 22	3796.9	24.06

A second series, four bags of 1000 grammes each, taken from bin September 4, weighed :

Total weight September 4	4000.0	.....
September 14	3888.9	2.77
September 21	3875.0	3.12
September 28	3913.9	2.15
October 5	3937.1	1.57
October 12	3912.7	2.18
November 22.....	3675.0	8.12

Between October 12 and November 22, the laboratory in which the samples were kept was warmed in the usual manner of a dwelling room, by steam heat.

The wheat in the first table, harvested July 16, and hand threshed July 18, contained 27.02 per cent of water by analysis, and hence we have for the water content of the wheat at the various weighings the difference between the per cent of loss and 27.02 per cent, whereby we see that the lowest water contents exposed to the natural air of the room was August 24, when it dried to about 6.40 per cent; and on November 22, in a steam-heated room, it was about 2.96 per cent.

On September 22, and at various dates thereafter, samples were taken from a bin containing several hundred bushels, from the interior of the mass, and subjected to analysis for the purpose of obtaining the moisture at date. The results were,

September	22.....	11.96	per cent moisture.
October	13.....	16.57	" "
	23.....	14.62	" "
November	1.....	14.17	" "
	12.....	14.84	" "

OATS.

On September 5 three 1000 gramme samples were taken from the oat bin, and suspended in netted bags from the ceiling of the laboratory alongside of the wheats. The weighings at different dates were,

		Grammes.	Per cent loss or gain.
September	5	3000	....
"	14	2971.7	0.94
"	21	2964.4	1.18
"	28	3006.0	0.20
October	5	3024.1	0.80
"	12	3005.0	0.16
November	22	2833.3	5.56

The last weighing, as before, was of the grain exposed to the heated air of the room.

The samples taken from the grain bin, at various dates, contained the following per cents of moisture:

October	13.....	11.25	per cent moisture.
"	23.....	12.67	" "
November	1.....	11.67	" "
"	12.....	11.51	" "

In comparing the extremes of weights in the wheats and oats we note a change between the lowest water content in the natural air and that of the heated air, of 3.44 per cent for the wheat, and 4.62 per cent for the oats. According to experiments made at the Uni-

versity of California, perfectly dried grain exposed in shallow layers to a saturated atmosphere of 64.4 F. for eighteen days will increase in weight, wheat 25 per cent, barley 28.2 per cent and oats 29.1 per cent. According to Professor Brewer, grain weighed February 1881, and September 1881, under conditions similar to ours, gained in weight 8.1 per cent for wheat, 7.2 per cent for oats.

In the water determinations of the American analyses collated by Professor Brewer, in the Tenth Census volume on Agriculture, in 71 analyses the variation was from 7.49 to 13.77 per cent for wheat, the average being 11.07 per cent; in 20 samples of oats the variation was from 8.91 to 12.36 per cent, the average being 10.56.

These analyses were, however, probably of samples that had been kept under different conditions before analysis than exist in the bin, and hence cannot afford data of the same character as that presented by our determinations. From our results we may calculate that merchantable wheat and oats, in bulk, as sold in the late autumn months contain about fourteen per cent and eleven per cent of water, respectively.

HYBRID BARLEY.

We have had an interesting experience this year with the changes that may arise through the use of hybridized seed. In April last, Mr. Horsford, a hybridizer and seed-grower of Vermont, sent us one head of a cross bred awnless barley, which shelled out twenty-eight seed. On May 1, these seed were planted in order as taken from the head, single kernels six inches apart in the row, and two feet from other rows. Of these, twenty-six seed vegetated and gave crop. August 30 the crop was harvested, and was found to consist of just four distinct kinds of grain. The original head, sent as a *cross bred* for trial, be it understood, answered to the description of *Hordeum trifurcatum* Ser., "remarkable for its beardless ear; in the place of beards the glumes carry on their summit a short tongue with three teeth. The leaves are large, the stalks thick, and the grain naked." * * * "It appears to have come originally from Nepaul, at least it was first introduced under the name of Nepaul Barley." *Bon Jardinier*, 1882. The seed black. The statistics of our crop is as below.

Seed	1 bore	21 heads:	black, not bearded. †
Seed	2 bore	14 heads:	black, bearded.
Seed	3 bore	16 heads:	black, not bearded.
Seed	4 bore	10 heads:	black, not bearded.
Seed	5 bore	15 heads:	white, bearded.
Seed	6 bore	14 heads:	white, not bearded.
Seed	7 bore	15 heads:	black, bearded.
Seed	8 bore	10 heads:	black, bearded.
Seed	9 bore	14 heads:	black, not bearded.

†The not bearded means the *Hordeum trifurcatum* form in every case.

Seed 10 bore 22 heads: black, bearded.
 Seed 11 bore 2 heads: black, not bearded.
 Seed 12 bore 15 heads: black, not bearded.
 Seed 13*bore 32 heads: black, not bearded.
 Seed 14 did not vegetate.
 Seed 15 bore 15 heads: black, not bearded.
 Seed 16 bore 20 heads: black, not bearded.
 Seed 17 bore 15 heads: black, not bearded.
 Seed 18 bore 18 heads: white, not bearded.
 Seed 19 bore 14 heads: white, bearded.
 Seed 20 bore 14 heads: black, bearded.
 Seed 21 bore 10 heads: black, not bearded.
 Seed 22 bore 24 heads: white, not bearded.
 Seed 23 bore 13 heads: black, not bearded.
 Seed 24 bore 5 heads: white, not bearded.
 Seed 25 bore 42 heads: black, white, not bearded.

Summarizing these results, and giving the yield in dry grain we have :

	Seeds.	Heads.	Average heads to seeds.	Yield in ounces.	Yield per plant in grains.
Not bearded, black	13	189	14.5	7.43	250
Bearded, black	6	90	15.0	4.63	337
Not bearded, white	5	82	16.4	3.25	285
Bearded white	2	29	14.5	1.66	364
Total	26	390	15.0	16.97	286
				1.06 lbs.	

The first reflection we have to make is upon the ease with which a good variety can be increased even where we have but a single head to work from. The yield in the case above is at the rate of a bushel of grain per $45 \frac{1}{2}$ heads, or from 1176 kernels planted : or placing it in another form, three seed planted furnished enough seed for a bushel of succeeding crop.

We must note also the effect of the hybridization from which the original head planted was the outcome. We have as a crop four distinct varieties of grain, between which there are *no intermediate forms or colors*. We have as a total eighteen beardless and eight bearded plants, or 271 beardless and 119 bearded heads. We thus see that a cross does not necessarily mean evenness of potency upon the part of the parents, and when we consider that there were produced four distinct varieties, we must consider that either more than one cross was included in the seed, or else that the effect of the crossing was to bring atavism into play, and to discover several crossings of the past.

*Seed 13 and seed 25 had really two seed planted : as in either case one seed seemed shrivelled and poor, and it was not expected to grow.

This seed gained, will be carefully kept separate, and planted next year, each variety by itself, in order to follow the outcome still further in a statistical manner.

WHEAT IMPROVEMENT.

September 21, -883, single kernels of wheat in order as taken from the heads were planted two by one foot apart.

Station No.	Variety.		No. kernels.	No. of plants living.	
				Oct. 19, 1883.	April 19, 1884.
A 113?	badly shrivelled	5 heads in the stool.	36	20	8
114	"		40	35	9
115	"		36	31	11
116	"		49	46	18
117	"		37	33	12
B 118	Lancaster		35	34	5
119	"		33	30	1
120	"		38	35	4
110			43	42	2
111			36	35	3
C 125?	badly shrivelled	83 heads to the stool.	38	35	18
126	"		42	30	4
127	"		35	30	4
128	"		33	25	5
129	"		32	31	12
D 133?	beardless		43	41	6
134	"		37	35	3
135	"		45	40	9
136	"		37	35	3
137	"		53	51	0
E 141	Mediterranean hybrid		46	43	16
142	"		50	46	3
143	"		49	46	2
144	"		48	45	2
146	"		48	46	1
F 97	Mediterranean		32	30	7
98	"		46	45	4
99	"		48	45	5
102	"		40	38	9
109	"		38	38	6

Station No.	Variety.	No. kernels.	No. of plants living.	
			Oct. 19, 1883.	April 19, 1884.
G 121	Sandomirka	66	63	8
130	"	63	61	7
131	"	68	65	11
138	"	60	57	6
148	"	49	49	13
H 150	Rice	47	43	10
151	"	44	40	4
154	"	40	36	7
155	"	42	39	18
I 87	Washington Glass.....	60	52	0
88	"	53	51	1
93	"	54	44	0
94	"	59	37	0
95	"	54	45	2
J 104	Clawson	47	42	33
105	"	30	25	5
106	"	38	37	19
107	"	31	27	15
108	"	38	38	13
K	Seed from Germany (Sept. 27).	84	76	0
Totals.				
A 5	heads Station selection, badly shrivelled	198	165	58
B 5	" Lancaster.....	185	176	15
C 5	" Station selection, badly shrivelled	180	151	43
D 5	" Station selection, beardless sport.....	215	202	21
E 5	" Mediterranean hybrid...	241	226	24
F 5	" Mediterranean.....	204	196	31
G 5	" Sandomirka.....	306	295	45
H 4	" Rice	173	158	39
I 5	" Washington glass.....	280	229	3
J 5	" Clawson.....	184	169	85
K 1	" from Germany.....	84	76	0

In these different lots we find for the average per cent of each selection.

Seed.	Per cent grew.	Per cent survived winter.	Per cent of those that grew that survived winter.
A	88	29	35
B	95	8	8 1-2
C	84	24	28
D	94	10	10
E	93	10	10 1-2
F	96	15	15
G	96	15	15
H	91	23	24
I	82	1	1
J	92	46	50
K	90	0	0

The variation in the hardiness of the varieties will be at once seen and it will be further noted that the Clawson stands pre-eminent, and yet why so many should perish under the favorable conditions of location it is difficult to say. It is quite possible that in the field, plants mutually protect each other to a certain extent. It will be further observed that in no one case did all the seeds of a planting grow, and yet in single heads all the seed formed plants in No. F. 109, G. 148 and J. 108. Although badly shrivelled seeds in a number of germination trials showed a greater power of germination than did plump seeds, yet as will be observed, such shrivelled seeds show a deficient power to vegetate, as compared with the plumper kernels.

The stooling of these plants varied considerably. Thus the series averaged in crop.

A	8.4	heads to a seed.
B	7.6	"
C	10.6	"
D	8.9	"
E	9.1	"
F	9.4	"
G	8.0	"
H	14.0	"
I	0.0	"
J	11.0	"

The series A and C represent the same variety, the heads alike, but A. from a stool of five heads, C from a stool of thirty-three heads, the five heads of each series taken from the one stool. Let us compare the heads at harvest, and see whether the influence of the selection is apparent:

Each figure in numerals represents the position of the seed in the head.

NUMBER OF HEADS TO A PLANT.

Plant.	Station Nos.	Series A.					Series C.				
		113, Hds.	114, Hds.	115, Hds.	116, Hds.	117, Hds.	125, Hds.	126, Hds.	127, Hds.	128, Hds.	129, Hds.
I.....		12	..	..	.	..	..	..
IV.....		6	.	..	..	..
V.....		5	...	..	15	.	..	..	..
VI.....		7	...	..	...	.	..	..	..
VII.....		4	..	...	.	..	..	..
VIII.....		..	2	..	...	..	...	.	..	..	..
IX.....		24	.	..	..	13
X.....		7	.	..	..	14
XI.....		..	3	..	...	..	16	.	..	..	2
XII.....		10	6	.	..	..	11
XIV.....		4	..	11	3	..	8	.	..	..	..
XV.....		6	..	..	...	..	...	.	..	..	..
XVII.....		2
XVIII.....		17	10	..	17	..	...	5	..	..	10
XIX.....		10	15	13	7	.	..	..	..
XX.....		18	14	..
XXI.....		1	14	.	8	..	..
XXII.....		..	14	..	...	..	...	.	..	..	..
XXIV.....		11	10	...	.	..	..	..
XXV.....		5	8	...	.	..	..	..
XXVI.....		2	11	..	10	.	..	..	..
XXVII.....		12	.	..	..	..
XXVIII.....		7	..	...	.	..	..	..
XXX.....		6	..	...	.	..	..	..
XXXI.....		16	..	...	.	..	..	..
XXXII.....		5	7	..	...	.	..	..	..
XXXIII.....		5	...	..	...	.	..	..	..
XXXV.....		..	13	..	...	..	...	.	..	..	..
XXXVII.....		5	..	...	.	..	..	..
XXXIX.....		13	..	...	.	..	..	..
XLVII.....		5	..	...	.	..	..	..
Total from head...		27	42	45	137	42	125	5	26	14	52
Average per seed..		9	8.4	6.4	9.1	8.4	11.4	5	18	14	8.7

We may summarize the statistics of the plants living at three dates, as below ; for series A and C

Station No.	Kernels planted.	No. of plants living.		
		Oct. 19, 1883.	Apr. 19, 1884.	July 8, 1884.
A 113.....	36	20	8	3
114.....	40	35	9	5
115.....	36	31	11	7
116.....	49	46	18	15
117.....	37	33	12	5
	198	165	58	35
C 125.....	38	35	18	11
126.....	42	30	4	1
127.....	35	30	4	2
128.....	33	25	5	1
129.....	32	31	12	6
	180	151	43	21

We thus are furnished with the following conclusions, derived from the comparison of Series A and C. There is a difference in the amount of seed which vegetates; in the number that winter kills; in the number of the survivors in the spring that furnish crop; in the number of heads born from one seed; that one head is distinctly better than other heads, and that one seed of a head is distinctly better than the other kernels of the head.

It follows therefore that a series of selections directed towards securing for seed use the yield of the best individual seed, as determined by cropping, offers promise of gain in the improvement of seed wheat. In further support of this view, we may note that in the various series, B D to J, the selection being from the heads alone, no gain was secured in the number of breasts upon the heads harvested: in Series A and C, the selection from the best heads from the best plant, the original eighteen breasts were changed to twenty-two.

From Series A and C, two plants were selected from which seed was to be saved for next year's crop. The statistics of the plants are as below:

A 113, the head was from a stool of seventeen heads, the product of the eighteenth seed from the base of the head which furnished the stool.

A 116, the head was from a stool of sixteen heads, the product of the thirty-first seed from the base of the head which furnished the stool.

C 125, the head was from a stool of twenty-four heads, the product of the ninth seed from the base of the head which furnished the stool.

CHARACTER OF THE SELECTED HEADS.

Station No.	No of breasts.	No. of seed in the head.	Planted Sept.
			22, 1884 No plants growing Oct. 20, 1884.
113. 18.1	22	63	29
18.2	22	65	22
18.3	22	60	26
18.4	18	50	26
18.5	21	50	36
18.6	22	51	25
116. 31.1	25	61	23
31.2	22	66	45
31.3	21	50	25
31.4	21	65	46
31.5	23	62	22
31.6	20	55	29
125. 9.1	23	33	23
9.2	21	31	11
9.3	20	18	17
9.4	19	24	17
9.5	18	34	30
9.6	14	33	22

The number of seeds that failed to vegetate is very noticeable. In 125, the sparrows removed some kernels from the heads and also there were some kernels which did not fertilize.

CORN VS. FERTILIZER.

For the purposes of this presentation we have the records of the same plats for three years, and the figures which are to be given are as below for each half plat of one-twentieth of an acre, in sod in 1881. The yields in ear corn :

PLAT.	1882.		1883.		1884.		Total, 3 years.	
	Phos- phate. lbs.	Yield. lbs.	Phos- phate. lbs.	Yield. lbs.	Phos- phate. lbs.	Yield. lbs.	Phos. phate. lbs.	Yield. lbs.
I. A 1. upper	0	219	0	261	10	224	10	704
lower	0	199 1-4	0	222	10	206 1-2	10	628
I. A 2. upper	10	215	0	269	10	225	20	709
lower	10	180	0	219 1-2	10	202	20	601 1-2
I. A 3. upper	20	222	0	256	10	202	30	680
lower	20	199	0	237	10	218	30	654
I. A 4. upper	40	234	0	283 3-4	10	224 3-4	50	742 1-2
lower	40	227 1-2	0	254 1-2	10	247	50	729
I. A 5. upper	80	231	0	262 1-4	10	218 1-2	90	711 3-4
lower	80	227	0	268 1-4	10	238 1-2	90	738 3-4
II. A 1. upper	10	189 1-4	0	233	10	211 3-4	20	634
lower	10	135 1-2	0	65	40	196 1-2	20	397
II. A 2. upper	20	195	0	233 1-2	10	211 1-2	30	640
lower	20	211	0	162 1-2	10	234 1-2	30	608
II. A 3. upper	40	195	0	232 1-4	10	231 1-2	50	658 3-4
lower	40	191 1-2	0	142 3-4	10	234	50	568 1-4
II. A 4. upper	80	203	0	222 1-2	10	231 1-2	90	647
lower	80	190	0	102	10	230	90	522
II. A 5. upper	0	154 1-2	0	218	10	215 1-2	10	588
lower	0	194 1-2	0	102 1-4	10	241	10	537 3-4

In series I. A Waushakum corn was used, in series II. A, a yellow flint corn without name in 1882, and Waushakum in 1883 and 1884. In series II. A lower, in 1883 the plats were root-pruned to the injury of the plants. We must therefore observe that the conditions are not precise duplicates between the two series, yet are such as to admit of averaging the results, which we proceed to do, as follows :

Areas.	Average for the three years.			
	Phosphate used, lbs.	Yield, lbs.	Phos. per acre. lbs.	Yield per acre. bushels.
1-5 Acre.....	40	819	200	51.2
1-5 Acre.....	80	780	400	48.7
1-5 Acre.....	120	860	600	53.7
1-5 Acre.....	200	899	1000	65.2
1-5 Acre.....	360	871	1800	54.4

The average yield on the face of the figures is therefore 52.8 bushels per acre, the greatest variation from this average 4.1 bushels, or seven per cent.

We have now given the actual figures as obtained, but these figures are really not comparable for this purpose until we have corrected them through allowance for missing hills. By planting six

kernels of carefully selected seed in a hill, we hoped to be able to secure a full stand of four plants to a hill, by thinning. In 1882 and 1883 this result was practically secured, the plats scarcely showing a missing plant; in 1884 the vegetation was very uneven, and many hills were deficient in plants. Hence for a true comparison, and for services in discussing into causes of crop, we must use figures corrected to meet this circumstance of poor vegetation. The yield of soft corn in a measure is an indication of a favorable or otherwise season. Taking for a measure the yield of series I. A plats, we have for actual yields :

	1882.	1883.	1884.
Sound corn	2154 lbs.	2532 lbs.	2206 lbs.
Unsound corn.	62 lbs.	273 lbs.	98 lbs.
Per cent. unsound.	3 per cent.	11 per cent.	4 per cent.

And we must at once see that the season of 1883 was probably the least favorable of the series for this crop, and that the increased yield may have been the result of accidental conditions. If, however, we correct the 1884 plats to allow for the missing plants, we have for series I. A plats almost precise equivalency of yield with 1883. The table, as corrected, reads for I. A series :

	1882.	Corrected yields.		Ear corn.
		1883.	1884.	Total.
I. A 1	418½	483	471	1372½
I. A 2	385	488	480	1363
I. A 3	421	493	486	1400
I. A 4	461½	538	544	1543½
I. A 5	458	530	553	1541
	2154	2532	2534	7220

In plats of series II. A. for 1883 we have half of each plat root-pruned so severely as to seriously affect the yield. Under the supposition that the average yield of the lower portion would stand in the same relation to the upper portion as do the duplicate in other respect plats, we may correct the figures for 1883 in this respect, and those of 1884 for the missing hills, and have for series II. A :

	1882.	Corrected yields.		Ear corn.
	Lbs.	1883.	1884.	Total.
		Lbs.	Lbs.	Lbs.
II. A 1	324½	443	463	1230½
II. A 2	406	413	523	1372
II. A 3	386½	441	546	1373½
II. A 4	393	422	511	1326
II. A 5	349	405	526	1280
	1859½	2154	2569	6582½

Massing our corrected figures, therefore, according to the fertilizer applied, we have:

	1882. Phos. used, lbs. per acre.	Yield, bush. per acre.	1883. Phos. used.	Yield, bush. per acre.	1884. Phos. used, lbs. per acre.	Yield, bush. per acre.
I. A 1 and II. A 5	0	48.0	0	55.5	200	62.3
I. A 2 and II. A 1	200	45.0	0	58.2	200	58.9
I. A 3 and II. A 2	400	51.7	0	58.5	200	63.0
I. A 4 and II. A 3	800	53.0	0	61.2	200	68.1
I. A 5 and II. A 4	1600	53.2	0	59.5	200	66.5
Average		50.2		58.6		63.8

The summary of the above table is:

	Total phos. used per plat during 3 years.	Yield, average of 3 years, bush. per acre.
I. A 1 and II. A 5	40	55.3
I. A 2 and II. A 1	80	54.0
I. A 3 and II. A 2	120	57.7
I. A 4 and II. A 3	200	60.8
I. A 5 and II. A 4	360	59.7
Average		57.5

In these figures we are certainly not able to recognize any great influence from the fertilizer applied, either during any one year or during the three years of cropping.

TIP KERNELS OF CORN (MAIZE) FOR SEED.

In our 1883 trials designed for testing the influence of the position of the corn kernel upon the cob, with reference to the crop yielded therefrom, we were able to verify the observation of 1882, that the tip kernels yielded larger crop. In our 1884 trials the same result occurred. The seed used was the five-but, five-central and five-tip seed taken from the same ears of Waushakum corn and planted under equivalent circumstances. In 1883 we had under trial ten plats of one-twentieth of an acre each, and in 1884 two series of ten plats of the same area, the one corresponding to the 1883 plats designated as 1884 in the following table:

	Yield of but, central and tip corn kernels, in bushels per acre.		
	1883.	1884.	1884.
But seed	62.9 bush.	53.8 bush.	54.7 bush.
Central seed	62.5 "	54.5 "	56.1 "
Tip seed	64.7 "	57.1 "	56.3 "

We thus seem justified in our previous conclusion that the tip kernels are in no wise inferior in yield to the central kernels so far as this variety of flint corn is concerned.

The yield of the thirty plats, 1883 and 1884, from the three rows of each kind of planting, is given in the following tables in pounds. To reduce to twentieths of an acre it is necessary to multiply by three, as each kind of seed occupies one-third of the twentieth of an acre plats.

		Plat I.		Plat II.		Plat III.		Plat IV.		Plat V.	
		Upper.	Lower.	Upper.	Lower.	Upper.	Lower.	Upper.	Lower.	Upper.	Lower.
1883.	I. A	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
	Buts.....	85.4	70.6	92.0	76.1	79.8	80.2	93.5	79.2	88.0	94.6
	Centers.....	86.0	73.7	88.6	71.7	82.2	77.5	95.5	85.3	86.0	86.4
	Tips.....	89.4	76.7	87.4	71.7	94.2	79.8	94.6	89.7	88.2	87.0
1884.	I. A										
	Buts.....	72.4	69.9	78.7	64.0	66.1	67.6	76.4	77.6	71.6	73.1
	Centers.....	76.5	65.3	68.1	67.3	66.8	72.3	80.6	83.0	66.7	80.1
	Tips.....	74.9	71.1	78.2	70.9	68.8	78.0	67.6	86.4	80.0	85.3
1884.	II. A										
	Buts.....	71.2	65.2	73.0	71.6	76.5	77.9	71.5	76.3	69.1	77.6
	Centers.....	68.0	64.5	72.0	78.5	79.6	78.7	74.6	76.3	74.1	81.7
	Tips.....	72.6	66.7	66.6	84.5	75.4	77.4	75.2	77.6	72.4	81.6

Arranging these figures in order of size, we have :

Buts.	Centers.	Tips.
94.6	95.5	94.6
93.5	88.6	94.2
92.0	86.4	89.7
88.0	86.0	89.4
85.4	86.0	88.2
80.2	85.3	87.4
79.8	83.0	87.0
79.2	82.2	86.4
78.7	81.7	85.3
77.9	80.6	84.5
77.6	80.1	81.6
77.6	79.6	80.0
76.5	78.7	79.3
76.4	78.5	78.2
76.3	77.5	78.0
76.1	76.5	77.6
73.1	76.3	77.4
73.0	74.6	76.7
72.4	74.1	75.4
71.6	73.7	75.2
71.6	72.3	74.9
71.5	72.0	72.6

Buts.	Centers.	Tips.
71.2	71.7	72.4
70.6	68.1	71.7
69.9	68.0	71.1
69.1	67.3	70.9
67.6	66.8	68.8
66.1	66.7	67.6
65.2	65.3	66.7
64.0	64.5	66.6
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2286.7 lbs.	2307.6 lbs.	2369.4 lbs.

Buts	28.5 bushels or	57.1 bushels per acre.
Centers	28.8 “	57.7 “ “
Tips	29.6 “	59.2 “ “

In the three years trials the tips were superior in yield to a slight degree in twenty-eight times out of the thirty; the same superiority is noted in each trial of the three years, and hence we may consider it as proven that the tip kernels of corn are by no means inferior for use as seed to the central kernels.

It may be suggested that the differences in yield are but accidental and came into their present form through coincidences, the one series vegetating more seed than the other. In 1884 we had a count of the number of plants which grew to crop upon the full plats, and hence we can correct our plats to a full seeding in each case:

1884.	No. of plants.			Corrected yield to uniform number of plants, lbs.		
	Buts.	Centers.	Tips.	Buts.	Centers.	Tips.
I. A 1	418	416	415	155.3	155.5	160.5
I. A 2	409	403	406	158.9	153.3	167.6
I. A 3	389	388	404	156.9	163.6	165.7
I. A 4	393	395	395	178.8	188.9	177.8
I. A 5	371	374	385	177.9	194.4	195.9
II. A 1	405	388	413	153.9	155.8	153.6
II. A 2	373	393	371	176.6	174.6	171.8
II. A 3	393	388	385	179.0	186.1	185.7
II. A 4	402	401	404	167.8	171.8	171.6
II. A 5	390	403	393	171.3	176.1	178.8
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Total	3943	3949	3971	1576.4	1620.1	1629.0

Dividing the total weight of the ears by the average number of ears and the number of ears by the number of plants, in 1848, we have:

	Plants:	No. of sound ears.	No. ears to a plant.	Average weight per ear.
But seed furnished.....	3943	4242	1.075	5.45 ozs.
Central seed furnished....	3949	4317	1.093	5.46 ozs.
Tip seed furnished.....	3971	4463	1.123	5.41 ozs.

If we test these results again by the figures for the two series separately, we have :

Series I. A :

	Plants.	No. of sound ears.	No. ears to a plant.	Average weight per ear.
But seed yielded.....	1980	2113	1.067	5.43 ozs.
Central seed yielded.....	1976	2142	1.084	5.43 ozs.
Tip seed yielded.....	2005	2255	1.124	5.40 ozs.

Series II. A :

But seed yielded.....	1963	2229	1.135	5.24 ozs.
Central seed yielded.....	1973	2175	1.102	5.50 ozs.
Tip seed yielded.....	1966	2208	1.123	5.43 ozs.

The weight of a fine ear nine inches long was 7.81 ozs., and this will serve as a measure of the evenness of the sorting. The yield of unsound corn, was very light — everything, however, was harvested which had a husk enclosing, and hence we have the following figures for the two series, I. A and II. A :

	No. sound ears.	No. un- sound.		Weight sound ears.	Weight unsound.
But seed furnished ...	4242	689	16 per cent.	1447.3 lbs.	59.6 4 per cent.
Central seed furnished.	4317	650	15 per cent.	1474.7 lbs.	59.0 4 per cent.
Tip seed furnished	4463	665	15 per cent.	1511.2 lbs.	59.6 4 per cent.

These trials now continued over three years show that there is certainly no inferiority in quantity of yield in the tip corn, nor in the quality, however considered, and taken as verifications of our 1882 results, seem to give conclusive answer in favor of the tip seed. There is hence no object in the farmer rejecting any portion of his ear corn, of the Flint variety, while shelling for planting, while theoretical reasons as regarding maintaining his corn true to type suggest an advantage arising from the planting the seed of the whole ear.

CORN, VARIETY TESTS.

For the purpose of testing the prolificacy of varieties we planted in twentieth-acre areas, under duplicate conditions for this year, the maize advertised in the catalogue of Messrs. J. M. Thorburn & Company.

It is extremely difficult to effect comparisons of this kind, as varieties which ripen late contain more moisture at harvest than those which ripen earlier, and hence shrink more in the bin ; and even in varieties that ripen at about the same time the larger cobbled contain more water than the smaller cobbled sorts, and shrink more in the crib. The influence of irregular vegetation can, to a certain extent, be equalized by calculating the yields to a full seeding per plat. It was our intention to secure an even planting of four kernels to a hill, the hills being forty-two by forty-four inches apart, by planting six

kernels and thinning to four, a quantity that previous experience seemed to justify, but on account of the poor condition of the seed (which did not appear to the sight), or some unfavorable influence of the season, vegetation was oftentimes poor, and some hills even without thinning did not contain the four plants intended. Superphosphate was used at the rate of 400 pounds per acre.

The yield of the various plats in ear corn, as weighed at harvest, is expressed in the following tables:

Plat.	Flint Corns.	No of good ears.	Actual yield.		Lbs. unsound corn.
			Lbs. sound ear-corn.	No of poor ears.	
I. B 1.	Upper, Early Canada.....	625	201.6	22	1.7
II. B 5.	Lower, Early Canada.....	490	154.5	95	12.0
I. B 1.	Lower, Rural Thoroughbred....	340	172.7	195	40.4
I. B 2.	Upper, Golden Dew Drop.....	728	243.5	50	3.0
I. B 2.	Lower, Eight-rowed White.....	417	158.0	111	19.7
I. B 3.	Upper, Eight-rowed Yellow....	645	259.5	46	5.0
II. B 3.	Upper, Eight-rowed Yellow....	350	245.9	67	8.1
I. B 4.	Upper, Orange.....	454	204.7	82	5.5
I. B 5.	Upper, Flesh Color.....	500	243.0	37	7.4
I. B 5.	Lower, Compton's Surprise.....	635	281.2	47	2.0
II. B 1.	Upper, Compton's Surprise.....	518	233.2	49	7.2
Dent Corns.					
I. B 3.	Lower, Extra Early Adams.....	530	90.1	53	2.1
I. B 3.	Upper, Extra Early Adams.....	650	151.0	22	1.4
I. B 4.	Lower, Improved Blount's Prolific,	950	299.2	92	13.0
I. B 2.	Upper, do	685	237.6	175	37.4
I. B 1.	Lower, Sixty Day.....	540	243.1	34	4.8
I. B 4.	Upper, Golden.....	387	227.8	60	15.5
I. B 4.	Lower, Chester Co. Mammoth..	295	218.4	112	43.4
I. B 5.	Upper, Queen of the Prairie....	540	245.1	29	5.8
I. B 2.	Lower, Long Island White.....	507	262.4	16	2.5

The corrected yield to 684 plants per plat makes the following table, and expresses bushels (of 80 pounds) to the acre.

Flint Corns.	Corrected yield per plat, lbs.	Corrected yield per acre, bush.	Actual yield per acre, bush.
Early Canada.....	205.8	51.4	50.3
Early Canada.....	175.7	43.9	38.6
Rural Thoroughbred.....	179.3	44.8	43.2
Golden Dew Drop.....	246.4	61.6	60.9
Eight-rowed White.....	162.0	40.5	39.5
Eight-rowed Yellow.....	269.4	67.3	64.9
Eight-rowed Yellow.....	356.3	89.0	61.5
Orange.....	211.2	52.8	51.2
Flesh Color.....	253.7	63.4	60.7
Compton's Surprise.....	294.8	73.7	70.3
Compton's Surprise.....	263.1	65.7	58.3

Dent Corns.	Corrected yield per plat, lbs.	Corrected yield per acre, bush.	Actual yield per acre, bush.
Extra Early Adams.....	94.1	23.5	22.5
Extra Early Adams.....	159.0	39.7	37.7
Improved Blount's Prolific.....	308.2	77.0	74.8
Improved Blount's Prolific.....	290.7	72.6	59.4
Sixty Day.....	252.3	63.0	60.7
Golden.....	436.3	109.0	56.9
Chester Co. Mammoth.....	253.0	63.2	54.6
Queen of the Prairie.....	258.5	64.6	61.3
Long Island White.....	298.9	74.7	65.6

The number of sound ears per plant for the various plats is expressed in the following table.

Flint Corns.	No. sound ears.	Sound ears per plant.	Weight of sound ears per ear, oz's
Early Canada.....	625	.93	5.16
do.....	490	.81	5.04
Rural Thoroughbred.....	340	.51	8.13
Golden Dew Drop.....	728	1.08	5.35
Eight-rowed White.....	417	.62	6.06
Eight-rowed Yellow.....	645	.98	6.44
do.....	550	1.16	7.15
Orange.....	454	.68	4.94
Flesh Color.....	500	.76	7.77
Compton's Surprise.....	635	.97	7.09
do.....	518	.86	7.20

Dent Corns.	No. sound ears.	Sound ears per plant.	Weight of sound ears per ear, oz's
Extra Early Adams.....	530	.81	2.72
do.....	650	1.00	3.71
Improved Blount's Prolific.....	950	1.43	5.04
do.....	685	1.22	5.53
Sixty Day.....	540	.81	7.20
Golden.....	337	.94	10.81
Chester Co., Mammoth.....	295	.50	11.84
Queen of the Prairie.....	540	.83	7.26
Long Island White.....	507	.84	8.28

These weights give the average, at least, for all the ear corn which would be sorted as merchantable, for each crop.

The corns catalogued under the names as received can be described as follows:

FLINT CORNS.

COMPTON'S SURPRISE, Thorburn. Synonyms, *Compton's Early*, Ferry.
Ears seven to nine and one-half inches long; ear stalk large; ear

tapering, twelve-rowed, or usually more at butt portion; kernels rounding slightly if at all at butt, filling fairly well at tip, rather thick, rather shallow; color golden yellow; cob white, large. Ears borne about two feet from the ground, the plant about seven feet high and with eleven or twelve leaves.

*All the crop true to type.

EARLY CANADA, Thorburn. Synonyms, *Canada* of many seedsmen: *Canada Yellow* of others: *Peirce's Columbia*, Vaughan: *Pearce's Prolific*, Farmers' Advocate.

This type of corn is quite common in northern localities, and has many sub-varieties distinguished by greater length, slenderness or thickness of ear, or by color. The true type is as described below.

Ears six to eight inches long; ear stalk smallish; ear cylindrical, scarcely rounded at butt, bluntly at tip, which is often well filled, eight-rowed, rows straight; kernels rounded at summit and sides; color golden yellow or yellow orange; cob small, white. There is a tendency to taper slightly in lower third of ear. Ears about two feet from the ground, the plant six to seven feet tall and twelve or thirteen leaved.

*Our crop true to this type, and that of what I call New England Eight-rowed, is described below. The two sorts in nearly equal proportion, but the named variety rather predominating.

NEW ENGLAND EIGHT-ROWED. Synonyms, *Canada* of many; *Early Canada* of Gregory, Sibley, etc., *Canada Yellow*, *Early Canada* of Burr.

Ears eight to nine inches long; ear stalk medium to largish; ear cylindrical in most of its length, but swollen at butt through added , tapering a little at lower third to the often pointed tip, somewhat well filled. Its type commonly grown, but the seed usually d with Early Canada, through non-recognition of its distinct- Color orange yellow; cob white, small.

T-ROWED WHITE FLINT, Thorburn. Synonyms, *Silver White Flint*, Vaughan.

rs nine to eleven inches long; ear stalk smallish; ear cylindrical tapering slightly at lower third, not filling at tip, and with a tendency to openness between the pairs of rows; kernels thick, rounded at summit and sides; eight-rowed; color silvery white; cob small, medium size. Ears borne about two and one-quarter feet from the ground; plant six to seven feet high.

resembles Waushakum very closely in all but color. Silver Flint differs only in the color being a little dingy.

A few, very few, orange yellow kernels in our crop.

T-ROWED YELLOW FLINT, Thorburn.

differs in no respect from the preceding, except in color, which is yellow. Differs from Waushakum in the kernels being less

deep and not extending as far upwards at the butt, and the stalk hence better defined.

*In our crop some ears showing white ears of the preceding type.

FLESH COLOR FLINT.

Ears nine to ten inches long; ear stalk medium to large; ear of cylindrical type, but often tapering through openness between the pairs of rows towards the butt, tapering a little at lower third, and not filling well at tip; kernels rounding at summit and sides; color a brown yellow; cob white, medium large. Ears about two and one-half feet from the ground, plant about seven feet high.

*Our crop, principally brown yellow, but some ears, lemon yellow, others golden yellow. Some ears of eight-rowed white type, others of the New England eight-rowed type. A few white kernels, and some purple striped.

GOLDEN DEW-DROP, Thorburn.

Ears nine to ten inches long; ear stalk, smallish; ear tapering at lower third, otherwise cylindrical. Resembles Waushakum very closely, but in general the ears slightly longer, of greater diameter, and larger kernel; the same habit of growth; same golden orange color; cob white; eight rowed.

ORANGE FLINT, Thorburn.

Ears eight to nine and one-half inches long; ear stalk variable from small to medium large; ear cylindrical, tapering in lower fourth; slightly swollen at upper; often open at butt between rows; often not filling well at tip; kernel large, broad, rather straight on sides; color golden orange; cob white; eight rowed; ears about two feet from the ground; plant about seven and one-half feet high; ten to twelve leaved.

*In our crop some ears of Golden Dew-drop type, but not many; some ears with copperish yellow kernels, purple striped; a few white ears identical with the eight-rowed white.

RURAL THOROUGHbred.

Ears ten to twelve inches long; ear stalk medium; ears of cylindrical type, but always tapering through the openings between the pairs of rows, which is oftentimes excessive; never filling at tip; eight-rowed, but often ten-rowed at butt portion; kernel large, broader than deep, rounded; color dingy white; cob white, large; ears three feet from the ground, plant about eight feet high, twelve to 14 leaves; suckers much; very late for a flint, being at edible maturity August 25.

*In our crop some yellow kernels. A very coarse looking and uncouth variety, thoroughbred only in its undesirable properties.

DENT CORNS.

CHESTER COUNTY MAMMOTH, Thorburn.

Ears seven to eight inches long; ear stalk small; ear slightly tapering, rounded strongly at butt, and at tip, diameter large; kernels deep, closely set; color, yellow on top of kernels, orange below; cob red, large; eighteen to twenty four or more rowed; ears four feet from ground; plant about eight to nine feet tall.

Our crop with several forms of ears. The true type as described with loose open kernels, the consequence of the season being too short for ripening. Some ears nine inches long, nearly cylindrical but tapering toward the tip; small diameter; largish ear stalks; kernels scarcely rounding at butt, a broad and deep sulcus between rows, kernels polygonal, small tipped and dimpled, the color yellow above, orange below; other ears of the Leaming type, but longer, to twelve inches long, and cobs very slightly red tinged. In all some white dent and copper orange kernels.

EXTRA EARLY ADAMS, Thorburn.

Ears four to five inches long; ear stalk small; ear tapering strongly toward tip; the kernels often irregular; usually ten to fourteen-rowed; kernels flat, no sulcus between the rows; color white; cob white. Ears about two feet from ground, plant three to four feet high, eleven to twelve leaved.

*In our crop some ears six to seven inches long, which may be referred to Early Adams, twelve to sixteen-rowed, the plant taller, otherwise the description the same. Some yellow kernels.

GOLDEN DENT, Thorburn.

Ears six to nine inches long; ear stalk medium to large; ears ring, rounding a little at butt, long rounding at tip, with large neter, eighteen to twenty-rowed. Resembles the Leaming in many respects, but a "fatter" ear, thinner kernel, and deeper color. or golden orange; cob red; ears about three feet from ground, it about eight feet high.

In our crop some white kernels.

IMPROVED BLOUNT'S PROLIFIC, Thorburn.

Ears five to eight inches long, mostly ten to twelve-rowed; ear stalk small; ear cylindrical, tapering toward the tip. A broad and deep sulcus between the rows in the eight-rowed, narrower in the ten and twelve-rowed, with a tendency toward disappearance. Color white on surface of kernel, horny white below; cob white. Ears four and one-half feet from ground, plant seven to eight feet high, fifteen to seventeen leaved. Very late, scarcely fit to harvest before 14.

In our crop some yellow and purple striped kernels. Some yellow ears. The variety not as yet fixed to uniform appearance of

WIG ISLAND WHITE DENT, Thorburn.

Ears nine to ten inches long; ear stalk large; ears cylindrical in eight-rowed samples, tapering in the twelve-rowed, rounding but

slightly at butt, rather blunt pointed at tip, which is uncovered; kernels broad, a sulcus between rows varying greatly in width on different ears, in some scarcely discernible, in others changing the whole aspect of the ear. Kernels dead white on top, horny white below; cob red.

*Our crop varies greatly in the appearance of the ears, which however, on close examination, conform to the description. The kernels are all white on the surface, but in some ears flesh colored, and in others white below. Yellow and purple striped dent kernels a few. Not pure as a variety.

QUEEN OF THE PRAIRIE, Thorburn.

Ears six to eight inches long; ear-stalk small; ear a little too strongly tapering through suppression of rows in lower part, rounding strongly at butt, rather pointed at tip, which is not usually filled; kernel deep, no sulcus between rows, flat and square-cornered, orange yellow above, deep orange below; cob red; ears three and one-half feet above ground; plant nine feet high, twelve to fifteen leaved.

*Our crop shows two types of ears — one, the true one, answering to description, the other with sulci between the rows and resembling Wisconsin yellow. Some few white and a few purple-striped dent kernels.

SIXTY-DAY DENT, Thorburn.

Ears six to nine inches long; ear-stalk small to medium; ear slightly tapering, rather bluntly rounded at butt and tip, the latter well filled, twelve to eighteen-rowed; the kernel golden yellow on summit, orange below; cob red; a sulcus, narrow or broad, but deep, between the rows, thus causing a very variable appearance to the ears.

*In our crop some ears of the Chester county Mammoth type, and other ears, an eighteen-rowed flint, with red cob, and which can be referred to a North Carolina variety called Franklin's Yellow. A few ears are sixteen-rowed, the kernels arranged in pairs, with broad and deep sulci, the kernels so rounded as to remind of rice pop, a dimple on summit, the ears tapering strongly, rounding strongly and pointing to the strongly-covered tip, almost cone form, the color golden yellow in the dimple, orange as to the rest of the kernel. Other ears, yet, resemble the flint ears in shape, color of ear and kernel, but the kernels distinctly dented with a long crease, and all the kernels toward the tip, flint; one of the very few cases of flint and dent kernels on the same ear that have come under our observation.

CULTIVATION OF CORN.

For the purpose of measuring the effect of cultivation on corn, Series I A plats one to five, and Series II A plats one to five were selected, the plats one-tenth of an acre each; the hills forty-two by

forty-four inches apart, and 200 pounds of superphosphate applied per acre. Series I A was cultivated both ways, and Series II A had the weeds removed by light hoeing. The figures of the plats are as below, one column expressing correction to an equal number of hills:

Cultivated plats.			Not cultivated plats.		
	Actual yield, Lbs.	Corrected yield, Lbs.		Actual yield, Lbs.	Corrected yield, Lbs.
I A 1.....	430.5	471.4	II A 1....	408.4	463.2
2.....	427.4	480.0	2....	446.3	523.1
3.....	419.9	486.3	3....	465.8	546.3
4.....	471.8	544.7	4....	451.5	511.6
5.....	457.1	553.5	5....	456.6	526.6
Total for ½ acre.				2228.6	2570.8

These plats have been in corn for now three years. The comparison of the yields for the three years, the figures being corrected for uniformity, read:

Corrected yield for the various years: half acres.							
	1882.	1883.	1884.		1882.	1883.	1884.
	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.
Series I A..	2154	2532	2535	Series II A..	1859	2154	2570

These figures, however we can study them, do not indicate any advantage of cultivation upon these plats, as is more plainly seen by the recapitulation below:

Yield in bushels per acre.		
	1884.	Previous yields. 1882. 1883.
Cultivated plats	63.3	53.8 63.3
Not cultivated plats	64.2	46.4 53.8

Curiously enough, during three years' trial we have found no evidence strongly in favor of cultivation.

WEEDING OF CORN.

In order to determine whether weeds injured corn by shading the ground, two series of plats were mulched with straw, the III A series having one plat hoed, another plat mulched with straw on June 14 after a thorough hoeing. In series IV A one plat had lettuce seed broad-casted over the surface on July 1, while another plat was mulched with straw. Both series had the hills 42x44 inches apart and received superphosphate at the rate of 400 lbs. per acre. The variety, Waushakum Flint. The actual yields in ear corn and the calculated yields in bushels per acre are expressed in the table following:

Plat.	Yield per plat.		Yield per acre.	
	Sound corn.	Unsound corn.	Sound corn.	Unsound corn.
	No. of ears.	lbs.	No. ears.	lbs.
III. A upper, kept hoed	686	221.5	70	4.8
lower, mulched June 14	636	234.6	101	8.3
IV. A upper, lettuce as weed, July 1	567	161.2	73	5.0
lower, mulched July 1	517	175.8	89	6.5

This trial may be of interest as a curious attempt, but we fail to make any deductions from it. Perhaps future trials may throw more light. One thing seems evident. The mulching delayed ripening, and probably the extra amount of water at harvest makes the crop from the mulched portions seem slightly larger than they should be in the comparison. As the plants that vegetated and were left to form crop were not counted, through mistake, we have no means of correcting these figures to uniformly seeded plats.

CORN, THICKNESS OF PLANTING.

The trial was made with Waushakum corn, the hills 42x44 inches apart, 400 lbs. superphosphate used per acre. The actual yields, and the yields corrected to a full stand per plat, read as follows :

Plat.	Per plat.	Per plat.	Bush. per acre.
	Actual yield.	Corrected yield.	Corrected
	Lbs.	Lbs.	yield.
V. A upper, 1 plant to a hill	179.6	181.7	45.4
VI. A upper, 2 plants to a hill	190.4	193.8	48.4
V. A lower, 3 plants to a hill	287.0	243.1	60.7
VI. A lower 4 plants to a hill	205.1	237.7	59.4

We thus have indicated that three stalks to the hill gives the best results. We however can express additional facts from our data, as below for ear corn :

	No. of ears.		No. of ears per plant sound corn.	Wt. per ear sound corn.	Wt. per hill s. corn.	Wt. per plant sound corn.
	Sound corn.	Uns'nd corn.		ozs.	lbs.	lbs.
V. A upper, 1 plant per hill	500	151	2.99	5.747	1.06	1.06
VI. A upper, 2 plants per hill	540	57	1.60	5.641	1.11	.56
V. A lower, 3 plants perhill	650	83	1.82	5.754	1.38	.47
VI. A lower, 4 plants per hill	600	60	1.03	5.888	1.20	.35

The influence of the thin planting upon the product per plant is very manifest, while the influence upon the weight of the ear is not very plainly shown ; thinning the planting does not seem to reduce the number of unsound ears, but it does increase the number of ears borne to the plant, probably to a certain extent through the increase of suckers.

FORAGE CROPS.

The trials of forage crops were with Early Amber cane, Maize and Soja bean. The Soja bean gave very unsatisfactory results, furnishing neither sufficient forage for cutting nor seed. The cool season of last year

prevented our Soja bean plants from ripening their seed, and hence the variety upon which we founded quite favorable reports became lost to us. The variety this year, although the dry seed looked the same as last year's seed, yet gave us a low, little leafy and late plant. It seems useless to speak well or ill of this plant until the various forms which are sold under this general name of Soja bean shall receive more specific nomenclature.

CORN, AS A FORAGE PLANT.

In our trials we desired to ascertain the forage weights of different kinds of corn, and to make a comparison between maize and sorghum. The fertilizer used was the same quantity for all, 400 pounds superphosphate per acre. The plats one-twentieth of an acre :

	Yield, green forage, lbs.
C 2. Waushakum flint corn, in hills.....	1620
C 4. Waushakum flint corn, in hills.....	1639½
C 7. New England Pop, in drills*	1106
C 8. Evergreen Sweet, in drills.....	795
C 9. Waushakum Flint, in drills.....	1001
C 10. Minnesota Dent, in drills.....	1057

C 2 and C 4 had been heavily fertilized in 1882, C 2 received 1½ cords farm-yard manure and fifty pounds fertilizer per plat, and C 4 forty pounds fertilizer per plat, C 7, 8, 9 and 10 received twenty pounds fertilizer each in 1882 and 1883, the crop of 1882 being varieties of corn, that of 1883 potatoes. These four plats only are, therefore, fit subjects for comparison. The larger growing corns were in drills forty-four inches apart, about twelve kernels to a foot; the pop corn in drills twenty-two inches apart, and about twelve kernels to a foot. The yields per acre, for the three years, were,

	1882. Sound corn; bush. per acre.	1883. Potatoes, bush. per acre; merch. and unmerch.	1884. Green forage Aug. 19; tons per acre.
C 7.....	49.0 ¹	323.9 ⁵	11.06
C 8.....	27.8 ²	191.7 ⁶	7.95
C 9.....	35.2 ³	191.8 ⁷	10.01
C 10.....	44.3 ⁴	132.3 ⁸	10.57

- 1. Early Dent; scarcely merchantable on account of unripeness.
- 2. Sibley's Pride of the North; ripe and in good condition.
- 3. Chester Co. Mammoth; quite ripe and in fair condition.
- 4. Improved King Philip; ripe and in good condition.
- 5. White Star Potatoes, 162.3 bush. merchantable. Whole potatoes as seed.
- 6. White Star Potatoes, 152.1 bush. merchantable. Single eyes, cut deep.
- 7. White Star Potatoes, 159.5 bush. merchantable. Single eyes, cut half deep.
- 8. White Star Potatoes, 110.5 bush. merchantable. Single eyes, cut shallow.

*Rows half distance, or twenty-two inches.

. It seems possible that pop corn, New England or common pop variety, may be the best variety of corn for planting for forage purposes, on account of its admitting of close planting, and on account of the small size of its stalks. It certainly seems to afford more available feed to the ton green weight than any variety with which we are acquainted, and its supremacy in absolute magnitude of yield in our trial is well worthy of attention.

SORGHUM AS A FORAGE PLANT.

The plat devoted to cane for forage was planted at the same time as the corn, in the same distance of drill, but rather more seed to the foot. The same quantity of fertilizer was used. The yields of green forage, as cut August 20, a little before its height growth had ceased, in order to compare with corn forage of the same age was, as below, together with the cropping of the plats the preceding years.

	1882. Sound ear corn.	1883. Potatoes.	1883. Sorghum forage.
C 5	249 lbs.	667.6 lbs.	2254 lbs.
Per acre	62.2 bush.	222.5 bush.	22.54 tons.

In 1882, Waushakum corn, eighty pounds phosphate per plat. In 1883, White Star potatoes, single eyes, twenty pounds phosphate per plat, 129.6 bushels merchantable. In 1884, Early Amber cane, in drills forty-four inches apart, twenty pounds phosphate per plat. In plats C 11 and C 12, Early Amber cane in hills 42x44 inches for C 11, and 22x21 for C 12 twenty pounds phosphate per plat. The cropping in 1882 corn, in 1883 potatoes. The yield for the three years was, as below, the same amount of fertilizer, viz., twenty pounds per plat being applied each year.

	1882. Sound ear corn.	1883. Potatoes.	1883. Sorghum forage.
C. 11.....	337 1-2 lbs. unripe.	903 1-4 lbs.	1208 lbs.
C. 12.....	209 lbs. good.	698 1-2 lbs.	1297 lbs.

These trials all show that the Early Amber cane gave superior weight of green forage per acre to corn. Early Amber cane grows very slowly during the early part of the season, scarcely showing any vigor until August, but then its growth is exceedingly rapid.

CORN AND CANE FORAGE MIXED.

In two plats we had Waushakum corn and Early Amber cane planted in alternate rows, twenty pounds superphosphate being used per plat. The drills were forty-four inches apart, the corn seeded about twelve kernels per foot, the cane somewhat thicker. C 1 re-

ceived in 1881, 1 11-64 cords of farm-yard manure and fifty pounds of phosphate per plat. C 3, forty pounds phosphate per plat, and the yield 163 1-4 and 156 1-2 pounds of sound ear corn, respectively. In 1883 C 1, no fertilizer used, yielded 100 pounds of barley, with its straw. C 3, 817.6 pounds of potatoes, twenty pounds fertilizer being used per plat. The 1884 crop was harvested and weighed green August 18. The yield:

		C 1.	Per row.
ws sorghum.....	636 1-2 lbs.	127.3 lbs.	
ws corn.....	680 1-2 "	170.0 "	
Total.....	1317	146.3	
		C 3.	
ws sorghum.....	802 1-2 lbs.	200.6 lbs.	
ws corn.....	1002 1-2 "	200.5 "	
Total.....	1805	200.5	

this case the corn yielded more weight per row than the hum in C 1, and the same in C 3. The corn, however, was cut a just in proper condition; the sorghum was cut much too early, would doubtless have gained in weight for two weeks longer ast. The yield of the mixed crop was at the rate of 15.61 tons acre, of the corn portion 16.88 tons, of the sorghum 14.39 tons. may be well to summarize the actual yields of the forage plats, pective of treatment.

Yield per acre green forage :		Tons.
plats corn, in drills, average.....		12.03
greatest.....		16.39
least.....		7.95
se plats cane, in drills, average.....		17.96
greatest.....		22.54
least.....		12.08
plats corn and cane, in drills, average.....		15.61
greatest.....		18.05
least.....		13.17

'e cannot but perceive here that in our trials Early Amber cane ished more forage than did corn, but this comparison is not be- n plant and plant, but between areas which were intended to ally occupied, but not crowded in each case.

GERMINATIONS OF COMMERCIAL SEED.

The apparatus used in our germinations was the same as described in our second annual report, page 67, wherein fifty separate samples are kept under precisely similar conditions during the period of trial. As previous experiments all tend to indicate that a changing temperature is more potent than a uniform temperature, we paid but little attention to the temperature readings, the germinating boxes being placed in a cupboard where the temperatures ranged from seventy to eighty-four° F. Except in the case of the larger seeds, of which the pockets of the apparatus would not contain the number, one hundred seeds were used, and those that sprouted were daily removed and the number recorded. In every case a duplicate trial was made, the two trials of a kind occupying adjoining pockets in the same box. As will be noted, a variation appeared in nearly every case between the duplicates. The seeds used for the trial were from one of our leading seedsmen, and the apparently perfect seed were counted from the packets in which they came. The germination trials were continued in general until the seeds had either all sprouted or become rotten, and when any remained sound at the conclusion of the trials, such are recorded by number in their appropriate column. In the case of the beet family each seed case was counted as a seed.

It is probable that each species of seed, perhaps also some of the varieties, have one temperature at which the best results for germination occur, and unless these temperatures are quite nearly maintained we should not expect duplicate results as between germinations made at different times and under different circumstances of temperatures. We made, as will be seen, some duplicate trials, the germination boxes being dispersed in different rooms. In peas, for instance, eleven varieties, of which nine were two years old and two three years old, gave the following figures.

		Largest germ per cent.	Least germ per cent	Average germ per cent
9 var. 2 yrs. old				
Germ. temp. 70°-84°.	One series.....	88	20	60
	Duplicate	96	22	64
Germ. temp. 65°-75°.	One series.....	100	48	83
	Duplicate	100	56	88
2 var. 3 yrs. old.				
Germ. temp. 70°-84°.	One series.....	98	72	85
	Duplicate	100	64	82
Germ. temp. 65°-75°.	One series.....	100	92	96
	Duplicate	92	88	94

This table makes it appear as if before germination tests can be made of seedsmen's seeds, we must know the temperatures for best growth of each species, and our trials must be made within some ascertained limit of temperature before we can assume to sit in judgment over germinative qualities.

TABLE OF DUPLICATE GERMINATIONS.

VEGETABLE.	VARIETY.	Year of growth.	Date.
Artichoke .	Green Globe	1883	Oct. 3
	Duplicate	"	"
Asparagus. .	Conover's Colossal	"	"
	Duplicate	"	"
Bean.	Green Nonpareil	"	Nov. 4
	Duplicate	"	"
	Osborn's Forcing	1882	Oct. 3
	Duplicate	"	"
	French Yard Long.	1881	"
	Duplicate	"	"
Beet (Fruits)	New Dark Egyptian Turnip. .	1882	"
	Duplicate	"	"
	New Dark Egyptian Turnip. .	"	"
	Duplicate	"	"
	New Dark Egyptian Turnip. .	1883	"
	Duplicate	"	"
	New Dark Egyptian Turnip. .	1882	"
	Duplicate	"	"
	Dewing's Extra Early Turnip	"	"
	Duplicate	"	"
	Dewing's Extra Early Turnip	1881	"
	Duplicate	"	"
	Dewing's Extra Early Turnip	1874	"
	Duplicate	"	"
	Early Bassano.	1883	"
	Duplicate	"	"
	Early Bassano.	1871	"
	Duplicate	"	"
	Early Blood Turnip	1882	"
	Duplicate	"	"
	Early Blood Turnip	1869	"
	Duplicate	"	"
	Early Blood Turnip	1882	"
	Duplicate	"	"
	Long Smooth Blood	"	"
	Duplicate	"	"
	Long Smooth Blood	1881	"
	Duplicate	"	"
	Long Smooth Blood	1880	"
	Duplicate	"	"
	Long Smooth Blood	1869	"
	Duplicate	"	"
	Half Long Blood	1862	"
	Duplicate	"	"
	Ne Plus Ultra	1878	"
	Duplicate	"	"
	Scarlet Ribbed	1879	"
	Duplicate	"	"
	Golden Veined	1880	"
	Duplicate	"	"
	Scarlet Veined	"	"
	Duplicate	"	"
Mangel-wurzel			
Beet.	Long Yellow	1882	"
	Duplicate	"	"
	Long Red	"	"
	Duplicate	"	"
	Long Red.	1881	"
	Duplicate	"	"
	Yellow Ovoid	1883	"
	Duplicate	"	"
	Yellow Ovoid	1882	"
	Duplicate	"	"
	Yellow Ovoid.	1880	"
	Duplicate	"	"

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Size of seed.	Number of seed used	First seed sprouted; d's	Half sprouted; days.	Per cent difference between duplicates.
Mangel-wurzel Beet	Mammoth Red... .. .	1888	Oct. 31, 1884					
	Duplicate							12
	Mammoth Red.	1876	"					2
	Duplicate							
	Vilmorin's Imp. Sugar.....	1882	"					14
	Duplicate							
	Lane's Imp. Sugar.....	1881	"					2
	Duplicate							
	Hatch's Blood	1875	"					2
	Duplicate							
	Orange Globe Mangel.....	1876	"					1
	Duplicate							
	Yellow Intermediate Mangel	1878	"					4
	Duplicate							
Borage.	Borage	1882	"					2
	Duplicate							
Broccoli	Borage	1878	"					17
	Duplicate							
Broccoli	Early White	1882	"					2
	Duplicate							
	Early Purple	1880	"					17
	Duplicate							
	Early Purple Cape.	1883	"					1
	Duplicate							
	White Sprouting.	1882	"					2
	Duplicate							
	White Sprouting.....	1878	"					1
	Duplicate							
	Sulphur Color	1882	"					0
	Duplicate							
	Sulphur Color.....	1880	"					1
	Duplicate							
Brussels sprouts	Chappel Cream.....	1882	"					9
	Duplicate							
	Chappel Cream.....	1877	"					11
	Duplicate							
	Purple Sprouting.....	1879	Nov. 1, 1884					0
	Duplicate							
	Brussel's Sprouts.....	1883	"					6
	Duplicate							
	Brussel's Sprouts	1881	"					12
	Duplicate							
	Brussel's Sprouts.....	1875	"					0
	Duplicate							
	Improved Dwarf.....	1883	"					14
	Duplicate							
Burnett... ..	Burnett	1879	"					9
	Duplicate							
Cabbage.....	Etampes, very fine	1883	"					2
	Duplicate							
	Little Pizle.....	1882	"					5
	Duplicate							
	Little Pizle.....	1877	"					1
	Duplicate							
	Early Jersey Wakefield.....	1883	"					2
	Duplicate							
	Early Jersey Wakefield.....	"	"					1
	Duplicate							
	Early Jersey Wakefield ..	"	"					4
	Duplicate							
	Early Jersey Wakefield	1884	"					2
	Duplicate							
	Early Jersey Wakefield.....	1881	"					2
	Duplicate							

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Age of seed	Number of seed used.	First seed sprouted; d's.	Half sprouted; days.	Last sprouted; days.	Total days under trial.	Seed remaining sound.	Per cent germinated.	Per cent difference between duplicates.
Cabbage	Early Winningstadt.....	1888	Oct. 31, 1884	1	100	22	22	19	19	0	95	
	Duplicate	"	"	1	100	22	22	8	17	0	97	2
	Early Winningstadt.....	1882	Nov. 1, 1884	2	100	22	22	8	17	0	85	
	Duplicate	"	"	2	100	22	22	7	17	0	75	10
	Early Winningstadt.....	1881	"	3	100	22	22	15	17	0	74	
	Duplicate	"	"	3	100	22	22	9	17	0	73	1
	Savoy, Early Dwarf.....	1883	"	1	100	22	22	3	17	0	88	
	Duplicate	"	"	1	100	22	22	3	17	0	83	4
	Savoy, Early Dwarf.....	1876	"	8	100	4	5	14	19	0	8	
	Duplicate	"	"	8	100	3	4	10	19	0	6	0
	Savoy, Early Ulm.....	1883	"	1	100	22	22	8	17	0	92	
	Duplicate	"	"	1	100	22	22	8	17	0	91	1
	Savoy, Early Ulm	1873	"	11	100	0	0	0	19	0	0	
	Duplicate	"	"	11	100	0	0	0	19	0	0	0
	Early Oxheart.....	1881	"	3	100	22	22	15	19	0	80	
	Duplicate	"	"	3	100	22	22	17	19	0	83	3
	Large Early York	1883	"	1	100	22	22	9	19	0	68	
	Duplicate	"	"	1	100	22	22	17	19	0	77	11
	Improved Early Summer ...	"	"	1	100	22	22	17	19	0	88	
	Duplicate	"	"	1	100	22	22	3	19	0	96	0
	Early Flat Dutch.....	"	"	1	100	22	22	4	17	0	79	
	Duplicate	"	"	1	100	22	22	5	17	0	72	7
	Early Flat Dutch.....	1882	"	2	100	22	22	5	17	0	86	
	Duplicate	"	"	2	100	22	22	7	17	0	81	5
	Early Flat Dutch.....	1881	"	3	100	22	22	5	19	0	64	
	Duplicate	"	"	3	100	22	22	6	18	0	68	4
	Early Flat Dutch.	1883	"	1	100	22	22	14	19	0	70	
	Duplicate	"	"	1	100	22	22	13	19	0	65	5
	Large Late Bergen.	1874	"	10	100	22	22	34	40	0	38	
	Duplicate	"	"	10	100	22	22	35	39	0	22	14
	Large Late Drumhead	1877	"	7	100	22	22	28	32	0	30	
	Duplicate	"	"	7	100	22	22	28	32	0	20	10
	Large Late Drumhead.....	1882	"	2	100	22	22	7	20	0	66	
	Duplicate	"	"	2	100	22	22	18	20	0	70	4
	Large Late Drumhead... ..	1873	"	11	100	0	0	0	20	0	0	
	Duplicate	"	"	11	100	0	0	0	20	0	0	0
	Fine Large Flat Dutch.....	1882	"	2	100	22	22	6	17	0	70	
	Duplicate	"	"	2	100	22	22	8	17	0	77	7
	Fine Large Flat Dutch.....	1883	"	1	100	22	22	8	17	0	91	
	Duplicate	"	"	1	100	22	22	4	17	0	88	3
	Fine Large Flat Dutch	"	"	1	100	22	22	6	17	0	91	
	Duplicate	"	"	1	100	22	22	3	17	0	92	1
	Fine Large Flat Dutch.....	"	"	1	100	22	22	6	17	0	95	
	Duplicate	"	"	1	100	22	22	2	17	0	94	1
	Fine Large Flat Dutch.....	1882	"	2	100	22	22	20	30	0	36	
	Duplicate	"	"	2	100	22	22	25	30	0	41	5
	Fine Large Flat Dutch.	1881	"	3	100	22	22	7	19	0	14	
	Duplicate	"	"	3	100	22	22	5	19	0	16	2
	Fine Large Flat Dutch.	1878	"	6	100	22	22	25	30	0	20	
	Duplicate	"	"	6	100	22	22	24	30	0	14	6
	Fine Large Flat Dutch.....	1882	"	2	100	22	22	28	31	0	61	
	Duplicate	"	"	2	100	22	22	22	31	0	68	7
	Fine Large Flat Dutch.....	1887	"	17	100	8	8	8	20	0	1	
	Duplicate	"	"	17	100	0	0	0	20	0	0	1
	Fottler's Imp. Brunswick....	1882	"	2	100	22	22	7	17	0	87	
	Duplicate	"	"	2	100	22	22	8	17	0	93	6
	Fottler's Imp. Brunswick ...	1881	"	3	100	22	22	28	32	0	83	
	Duplicate	"	"	3	100	22	22	23	32	0	80	3
	White Brunswick	1887	"	17	100	8	8	8	19	0	1	
	Duplicate	"	"	17	100	4	4	4	19	0	1	3
	Filderkraut.....	1883	"	1	100	22	22	31	35	0	59	
	Duplicate	"	"	1	100	22	22	31	35	0	63	4
	Late Drumhead Savoy	"	"	1	100	22	22	8	17	0	97	
	Duplicate	"	"	1	100	22	22	6	17	0	95	2
	Late Drumhead Savoy.....	1881	"	3	100	22	22	4	17	0	88	
	Duplicate	"	"	3	100	22	22	17	19	0	93	4

TABLE OF GERMINATIONS—(Continued).

VEGETABLE.	VARIETY.
Cabbage	Late Drumhead Savoy... .. Duplicate
	Late Drumhead Savoy..... Duplicate
	Red Pickling..... .. Duplicate
	Early Rainham..... .. Duplicate
	St. John's Day Early Drumh'd Duplicate
	St. John's Day Early Drumh'd Duplicate
	Late St. John's Day Drumh'd Duplicate
	London Market
Cardoon	Duplicate
Carrot.	Large Solid..... .. Duplicate
	Extra Early Forcing..... Duplicate
	Extra Early Forcing Duplicate
	Early Horn Duplicate
	Early Horn..... .. Duplicate
	Half Long Red-Pointed Duplicate
	Half Long Red-Pointed Duplicate
	Half Long Red-Pointed..... Duplicate
	Half Long Stump Rooted... Duplicate
	Half Long Carenton Duplicate
	Half Long Carenton
	New Half Long Luc. short, Thick Duplicate
	Danvers
	Duplicate
	Danvers
	Duplicate
	Danvers
	Duplicate
	Long Orange..... .. Duplicate
	Long Orange
	Duplicate
	Long Orange
	Duplicate
	Long Orange..... .. Duplicate
	Altingham..... .. Duplicate
	Long White
	Duplicate
	Long White
	Duplicate
Cauliflower....	Extra Early Dwarf Erfurt.. Duplicate
	Early Dwarf Erfurt. Duplicate
	Early Dwarf Erfurt... .. Duplicate

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Age of seed	Number of seed used.	First seed sprouted; d.s.	Half sprouted; days.	Last sprouted; days.	Total days under trial.	Seed remaining sound.	Per cent germinated.	Per cent difference between duplicates.
Cabbage	Early Winningstadt.....	1888	Oct. 31, 1884	1	100	2	2	19	19	0	95	
	Duplicate	"	"	1	100	2	2	8	17	0	97	2
	Early Winningstadt.....	1882	Nov. 1, 1884	12	100	2	2	8	17	0	85	
	Duplicate	"	"	2	100	2	2	7	17	0	75	10
	Early Winningstadt.....	1881	"	3	100	2	2	15	17	0	74	
	Duplicate	"	"	3	100	2	2	9	17	0	73	1
	Savoy, Early Dwarf.....	1883	"	1	100	2	2	8	17	0	88	
	Duplicate	"	"	1	100	2	2	3	17	0	88	4
	Savoy, Early Dwarf.....	1876	"	8	100	4	5	14	19	0	6	
	Duplicate	"	"	8	100	4	5	10	19	0	6	0
	Savoy, Early Ulm.....	1883	"	1	100	3	4	8	17	0	92	
	Duplicate	"	"	1	100	2	2	3	17	0	91	1
	Savoy, Early Ulm	1873	"	11	100	0	0	0	19	0	0	
	Duplicate	"	"	11	100	0	0	0	19	0	0	0
	Early Oxheart.....	1881	"	3	100	2	3	15	19	0	80	
	Duplicate	"	"	3	100	2	3	17	19	0	83	3
	Large Early York	1883	"	1	100	2	2	9	19	0	88	
	Duplicate	"	"	1	100	2	2	17	19	0	77	11
	Improved Early Summer ..	"	"	1	100	2	2	17	19	0	98	
	Duplicate	"	"	1	100	2	2	3	19	0	98	0
	Early Flat Dutch.....	"	"	1	100	2	2	4	17	0	79	
	Duplicate	"	"	1	100	2	2	5	17	0	72	7
	Early Flat Dutch.....	1882	"	2	100	2	2	5	17	0	86	
	Duplicate	"	"	2	100	2	2	7	17	0	81	5
	Early Flat Dutch.....	1881	"	3	100	2	2	6	19	0	64	
	Duplicate	"	"	3	100	2	2	6	18	0	68	4
	Early Flat Dutch	1883	"	1	100	2	3	14	19	0	70	
	Duplicate	"	"	1	100	2	3	13	19	0	65	5
	Large Late Bergen	1874	"	10	100	3	3	84	40	0	88	
	Duplicate	"	"	10	100	2	3	85	30	0	22	14
	Large Late Drumhead	1877	"	7	100	2	6	28	32	0	30	
	Duplicate	"	"	7	100	2	5	28	32	0	20	10
	Large Late Drumhead.....	1882	"	2	100	2	2	7	20	0	68	
	Duplicate	"	"	2	100	2	2	18	20	0	70	4
	Large Late Drumhead	1873	"	11	100	0	0	0	20	0	0	
	Duplicate	"	"	11	100	0	0	0	20	0	0	0
	Fine Large Flat Dutch.....	1882	"	2	100	2	2	6	17	0	70	
	Duplicate	"	"	2	100	2	2	8	17	0	77	7
	Fine Large Flat Dutch.....	1883	"	1	100	2	2	8	17	0	91	
	Duplicate	"	"	1	100	2	2	4	17	0	88	3
	Fine Large Flat Dutch	"	"	1	100	2	2	6	17	0	91	
	Duplicate	"	"	1	100	2	2	8	17	0	92	1
	Fine Large Flat Dutch.....	"	"	1	100	2	2	6	17	0	95	
	Duplicate	"	"	1	100	2	2	2	17	0	94	1
	Fine Large Flat Dutch.....	1882	"	2	100	2	2	20	30	0	36	
	Duplicate	"	"	2	100	2	3	25	30	0	41	5
	Fine Large Flat Dutch	1881	"	3	100	2	2	7	19	0	14	
	Duplicate	"	"	3	100	2	2	5	19	0	16	2
	Fine Large Flat Dutch	1873	"	6	100	2	8	25	30	0	20	
	Duplicate	"	"	6	100	2	4	24	30	0	14	6
	Fine Large Flat Dutch.....	1882	"	2	100	2	3	28	31	0	61	
	Duplicate	"	"	2	100	2	4	22	31	0	68	7
	Fine Large Flat Dutch.....	1867	"	17	100	8	8	8	20	0	1	
	Duplicate	"	"	17	100	0	0	0	20	0	0	1
	Fottler's Imp. Brunswick....	1882	"	2	100	2	2	7	17	0	87	
	Duplicate	"	"	2	100	2	2	8	17	0	93	6
	Fottler's Imp. Brunswick ..	1881	"	3	100	2	4	28	32	0	88	
	Duplicate	"	"	3	100	2	4	23	32	0	80	3
	White Brunswick ..	1867	"	17	100	8	8	8	19	0	1	
	Duplicate	"	"	17	100	4	4	4	19	0	1	3
	Filderkraut.....	1883	"	1	100	2	2	31	35	0	50	
	Duplicate	"	"	1	100	2	3	31	35	0	63	4
	Late Drumhead Savoy	"	"	1	100	2	2	8	17	0	97	
	Duplicate	"	"	1	100	2	2	6	17	0	95	2
	Late Drumhead Savoy.....	1881	"	3	100	2	2	4	17	0	80	
	Duplicate	"	"	3	100	2	2	17	19	0	98	4

TABLE OF GERMINATIONS — (Continued).

VEG

Cabb

Carde

Carro

Caul

TABLE OF GERMINATIONS—(Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Age of seed.	Number of seed used.	First seed sprouted; d's.	Half sprouted; days.	Last sprouted; days.	Total days under trial.	Seed remaining sound.	Per cent germinated.	Per cent difference between duplicates.
Cauliflower ...	Early Snowball.....	1883	Nov. 20, 1884	1	100	1	1	5	11	0	80	
	Duplicate.....	1883	"	1	100	1	1	5	11	0	77	3
	Early Paris.....	"	"	1	100	1	1	5	11	0	83	
	Duplicate.....	"	"	1	100	1	1	4	11	0	87	2
	Imperial.....	"	"	1	100	1	1	4	11	0	88	
	Duplicate.....	"	"	1	100	1	1	5	11	0	88	5
	Imperial.....	1880	"	4	100	1	3	28	38	0	40	0
	Duplicate.....	1880	"	4	100	1	4	31	35	0	40	0
	Large Algiers.....	1883	"	1	100	1	1	11	11	0	97	15
	Duplicate.....	"	"	1	100	1	1	7	8	0	82	
	Large Early London..	"	"	1	100	1	1	9	9	0	98	11
	Duplicate.....	"	"	1	100	1	1	11	11	0	77	
	Large Early London ..	1881	"	3	100	1	2	28	38	0	58	13
	Duplicate.....	"	"	3	100	1	2	28	35	0	69	
	Thorburn's Nonpareil...	1883	"	1	100	1	1	10	22	0	87	9
	Duplicate.....	"	"	1	100	1	1	5	22	0	78	
	Thorburn's Nonpareil ..	1882	"	2	100	1	1	7	22	0	97	6
	Duplicate.....	"	"	2	100	1	1	3	22	0	91	
	Thorburn's Nonpareil....	1880	"	4	100	1	2	15	19	0	95	1
	Duplicate.....	"	"	4	100	1	2	6	21	0	94	4
	Half Long Dwarf French ..	1883	"	1	100	1	1	8	12	0	83	
	Duplicate.....	"	"	1	100	1	1	5	5	0	97	4
	Stadtholder.....	"	"	1	100	1	1	10	28	0	90	
	Duplicate.....	"	"	1	100	1	1	11	22	0	88	2
	Early Walcheren.....	"	"	1	100	1	1	8	22	0	94	3
	Duplicate.....	"	"	1	100	1	1	8	22	0	91	
	Early Walcheren.....	1881	"	8	100	1	1	11	22	0	77	6
	Duplicate.....	"	"	8	100	1	1	11	20	0	88	4
	Lenormand's Short Stem ..	1882	"	2	100	1	1	4	8	0	88	
	Duplicate.....	"	"	2	100	1	1	4	11	0	79	3
	Lenormand's Short Stem....	1881	"	3	100	1	1	17	22	0	47	
	Duplicate.....	"	"	3	100	1	1	8	21	0	50	1
	Autumn Giant.....	"	"	3	100	1	2	9	21	0	70	
	Duplicate.....	"	"	3	100	1	2	9	21	0	71	6
	Wonderful.....	1880	"	4	100	1	3	9	17	0	86	4
	Duplicate.....	"	"	4	100	1	3	8	22	0	30	
Celery.....	White Walnut.....	1862	"	2	100	6	7	8	22	0	6	
	Duplicate.....	"	"	2	100	10	10	10	22	0	2	4
	Incomparable Dw'f. Crimson	1883	"	1	100	0	0	0	22	0	0	
	Duplicate.....	"	"	1	100	0	0	0	22	0	0	0
Celeriac.....	Incomparable Dwarf Crimson	1882	Nov. 21, 1884	2	100	8	11	37	50	0	22	7
	Duplicate.....	"	"	2	100	9	11	35	50	0	15	
	Celeriac or Turnip Rooted..	1883	"	1	100	8	15	39	50	0	27	1
	Duplicate.....	"	"	1	100	7	14	40	50	0	28	
Celeriac.....	Celeriac or Turnip Rooted..	1881	"	3	100	0	0	0	22	0	0	0
	Duplicate.....	"	"	3	100	0	0	0	22	0	0	0
	New Apple.....	1879	"	5	100	0	0	0	22	0	0	0
	Duplicate.....	"	"	5	100	0	0	0	22	0	0	0
Corn Salad	Chervil.....	1883	"	1	100	4	6	13	50	9	71	13
	Duplicate.....	"	"	1	100	4	6	11	50	7	58	
	Chervil.....	1881	"	3	100	4	7	13	50	7	58	11
	Duplicate.....	"	"	3	100	4	6	11	50	4	69	
Cress.....	Corn Salad or Fetticus ..	1883	"	1	100	3	3	8	12	0	72	2
	Duplicate.....	"	"	1	100	3	3	7	12	0	74	
	Small Seeded.....	1875	"	9	100	0	0	0	22	0	0	0
	Duplicate.....	"	"	9	100	0	0	0	22	0	0	0
Cucumber .	Green Cabbaging.....	1877	"	7	100	0	0	0	22	0	0	5
	Duplicate.....	"	"	7	100	9	12	17	22	0	5	
	Lettuce Leaved.....	1876	"	8	100	0	0	0	22	0	0	0
	Duplicate.....	"	"	8	100	0	0	0	22	0	0	0
Cress.....	Curled (pepper grass).....	1877	"	7	100	3	4	10	12	0	52	3
	Duplicate.....	"	"	7	100	3	4	9	12	0	49	
	Broad Leaved.....	1878	"	6	100	3	4	14	19	0	45	7
	Duplicate.....	"	"	6	100	3	5	10	21	0	52	
Cucumber .	Swan's Neck.....	1880	"	4	25	3	3	5	21	0	88	16
	Duplicate.....	"	"	4	25	3	3	8	17	0	72	

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date test
Cucumber. . .	General Grant... ..	1879	Nov. 21,
	Duplicate	"	"
Dandelion . . .	Dandelion	1883	"
	Duplicate	"	"
Egg Plant.....	Long Purple.....	1875	"
	Duplicate	"	"
Endive	Green Curled.....	1866	"
	Duplicate	"	"
	White Curled.....	1882	"
	Duplicate	"	"
	Moss Curled.....	"	"
	Duplicate	"	"
	Moss Curled.....	1881	"
	Duplicate	"	"
Kohl-Rabi.	Early White Vienna, above ground	1883	"
	Duplicate	"	"
	Early Purple Vienna, above ground	1880	"
	Duplicate	"	"
	Large White or Green.....	1883	"
	Duplicate	"	"
	Large White or Green.....	1887	"
	Duplicate	"	"
	Large White or Green.....	1884	"
	Duplicate	"	"
Leek	Fine Large Flag.....	1883	"
	Duplicate	"	"
	Fine Large Flag.....	1877	"
	Duplicate	"	"
	Large Rouen	1883	"
	Duplicate	"	"
	Large Rouen	1880	"
	Duplicate	"	"
	New Large Carenton... ..	1883	"
	Duplicate	"	"
	New Large Carenton.....	1877	"
	Duplicate	"	"
Lettuce	Early Curled Simpson . . .	1883	"
	Duplicate	"	"
	Black Seeded Simpson . . .	"	"
	Duplicate	"	"
	Black Seeded Simpson.....	1880	"
	Duplicate	"	"
	Black Seeded Simpson.....	1881	"
	Duplicate	"	"
	American Gathering . . .	1883	"
	Duplicate	"	"
	American Gathering . . .	1880	"
	Duplicate	"	"
	Early Tennis Ball or Boston.	1883	"
	Duplicate	"	"
	Early Tennis Ball or Boston.	1881	"
	Duplicate	"	"
	Early Tennis Ball or Boston	1880	"
	Duplicate	"	"
	Early Tennis Ball or Boston.	1882	"
	Duplicate	"	"
	Hanson	1883	"
	Duplicate	"	"
	Hanson	1880	"
	Duplicate	"	"
	Victoria Cabbage.....	"	"
	Duplicate	"	"
	Shotwell's Brown Head....	1881	"
	Duplicate	"	"

TABLE OF GERMINATIONS—(Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Age of seed.	Number of seed used	First seed sprouted; d's.	Half sprouted; days.	Last sprouted; days.	Total days under trial	Seed remaining sound.	Per cent germinated.	Per cent difference between duplicates.
Lettuce.....	Large White Summer Cabbage	1883	Nov. 21, 1884	2	100	2	2	2	2	0	2	
	Duplicate	"	"	2	100	2	2	2	2	0	2	7
	Golden Stone Head	"	"	2	100	2	2	2	2	0	2	2
	Duplicate	"	"	2	100	2	2	2	2	0	2	2
	Golden Stone Head	1880	"	4	100	2	2	2	2	0	2	2
	Duplicate	"	"	4	100	2	2	2	2	0	2	2
	India Head	"	"	4	100	2	2	2	2	0	2	2
	Duplicate	"	"	4	100	2	2	2	2	0	2	2
	India Head	1879	"	5	100	3	3	3	3	0	2	7
	Duplicate	"	"	5	100	4	4	4	4	0	2	7
	Brown Dutch	"	Nov. 28, 1884	5	100	1	1	1	1	0	4	0
	Duplicate	"	"	5	100	1	1	1	1	0	4	0
	Cabbage New Orleans	1881	"	3	100	1	1	1	1	0	91	5
	Duplicate	"	"	3	100	1	1	1	1	0	96	5
	Ice Drumhead	1880	"	4	100	1	1	1	1	0	13	2
	Duplicate	"	"	4	100	2	2	2	2	0	13	2
	Large Yellow Butter	1881	"	3	100	1	1	1	1	0	79	1
	Duplicate	"	"	3	100	1	1	1	1	0	78	1
	Grey Seeded Butter	1882	"	2	100	1	1	1	1	0	94	2
	Duplicate	"	"	2	100	1	1	1	1	0	96	2
	White Cos	"	"	2	100	1	1	1	1	0	96	0
	Duplicate	"	"	2	100	1	1	1	1	0	96	0
	White Cos	1881	"	3	100	1	1	1	1	0	98	5
	Duplicate	"	"	3	100	1	1	1	1	0	98	5
	Red Winter Cabbage	1883	"	1	100	1	1	1	1	0	50	2
	Duplicate	"	"	1	100	1	1	1	1	0	50	2
	Red Winter Cabbage	1881	"	0	0	2	2	2	2	0	8	1
	Duplicate	"	"	0	0	1	1	1	1	0	7	1
Melon Musk...	Fine Valparaiso	1876	"	50	50	4	4	4	11	0	22	6
	Duplicate	"	"	50	50	5	5	5	14	0	84	6
	Silf's Hybrid	1881	"	50	50	2	2	2	14	0	96	4
	Duplicate	"	"	50	50	2	2	2	14	0	96	4
	Allen's Superb	1880	"	50	50	2	2	2	13	0	96	3
	Duplicate	"	"	50	50	2	2	2	14	0	94	3
	Large Yellow Cantaloupe	"	"	50	50	2	2	2	14	0	90	4
	Duplicate	"	"	50	50	2	2	2	14	0	94	4
	Large Yellow Cantaloupe	1877	"	50	50	2	2	2	13	0	96	4
	Duplicate	"	"	50	50	2	2	2	14	0	96	4
Melon-Water...	Large Yellow Cantaloupe	1876	"	50	50	2	2	2	14	0	96	0
	Duplicate	"	"	50	50	2	2	2	30	0	24	0
	Large Yellow Cantaloupe	1877	"	50	50	2	2	2	30	1	86	2
	Duplicate	"	"	50	50	2	2	2	30	0	88	2
	Sculptured Seeded Japan	1873	"	25	25	2	2	2	30	0	15	4
	Duplicate	"	"	25	25	2	2	2	30	2	12	4
	Early Mountain Sprout	1881	"	25	25	2	2	2	14	0	88	3
	Duplicate	"	"	25	25	2	2	2	14	0	94	3
	Goodwin's Imperial	"	"	25	25	2	2	2	30	0	88	16
	Duplicate	"	"	25	25	3	3	3	30	2	72	16
Nasturtium ...	Apple Seeded	1872	"	25	25	3	3	3	30	2	20	4
	Duplicate	"	"	25	25	2	2	2	30	1	16	4
	Apple Seeded	1875	"	50	50	2	2	2	30	3	22	4
	Duplicate	"	"	50	50	2	2	2	30	3	16	4
	Black Italian	1881	"	25	25	6	6	6	30	1	53	4
	Duplicate	"	"	25	25	5	5	5	30	1	48	4
Onion	Tall	1882	"	20	20	4	4	4	0	0	100	0
	Duplicate	"	"	20	20	3	3	3	0	0	100	0
	The Queen	1884	Dec. 6,	00	00	2	2	2	11	0	41	3
	Duplicate	"	"	00	00	2	2	2	11	0	38	3
	The Queen	1883	"	00	00	1	1	1	30	0	70	7
	Duplicate	"	"	00	00	1	1	1	36	0	77	7
	The Queen	"	"	00	00	1	1	1	24	1	75	1
	Duplicate	"	"	00	00	1	1	1	24	1	64	1
	White Tripoli	"	"	00	00	1	1	1	23	0	62	3
	Duplicate	"	"	00	00	1	1	1	24	0	59	3
	White Portugal	"	"	00	00	1	1	1	10	0	90	0
	Duplicate	"	"	00	00	1	1	1	19	0	80	0

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.
Onion.....	White Portugal.....	1896
	Duplicate	" "
	White Portugal.....	" "
	Duplicate	" "
	White Portugal.....	1897
	Duplicate	" "
	White Portugal....	" "
	Duplicate	" "
	White Portugal ..	" "
	Duplicate	" "
	White Globe... ..	" "
	Duplicate	" "
	White Globe... ..	" "
	Duplicate	" "
	White Globe	" "
	Duplicate	" "
	White Globe	" "
	Duplicate	" "
	White Globe.....	" "
	Duplicate	" "
	White Globe.....	" "
	Duplicate	" "
	Early Red Flat.. .	1898
	Duplicate	" "
	Large Red Globe.....	" "
	Duplicate	" "
	Large Red Globe....	" "
	Duplicate	" "
	Large Red Globe ..	" "
	Duplicate	" "
	Large Red Globe ..	1899
	Duplicate	" "
	Large Red Globe.....	" "
	Duplicate	" "
	Large Red Globe.....	" "
	Duplicate	" "
	Large Red Globe.....	" "
	Duplicate	" "
	Large Red Globe.....	" "
	Duplicate	" "
	Large Red Globe.....	" "
	Duplicate	" "
	Large Red	1900
	Duplicate	" "
	Large Red	" "
	Duplicate	" "
	Large Red	" "
	Duplicate	" "
	Large Red	1901
	Duplicate	" "
	Large Red	" "
	Duplicate	" "
	Yellow Danvers.. .	1902
	Duplicate	" "
	Yellow Danvers... ..	" "
	Duplicate	" "
	Yellow Danvers.....	" "
	Duplicate	" "
	Yellow Danvers.....	1903
	Duplicate	" "
	Yellow Danvers	" "
	Duplicate	" "

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Age of seed	Number of seed used
Onions	Yellow Globe Danvers.....	1883	Dec. 6, 1884	1	10
	Duplicate	"	"	1	10
	Yellow Danvers	1883	"	2	10
	Duplicate	"	"	2	10
	Yellow Globe Danvers.....	"	"	2	10
	Duplicate	"	"	2	10
	Yellow Globe Danvers.....	"	"	2	10
	Duplicate	"	"	2	10
	Yellow Globe	1883	"	1	10
	Duplicate	"	"	1	10
	Yellow Globe	"	"	1	10
	Duplicate	"	"	1	10
	Yellow Globe	1882	"	2	10
	Duplicate	"	"	2	10
	Giant Rocco	1883	"	1	10
	Duplicate	"	"	1	10
	Giant Rocco	1881	"	3	10
	Duplicate	"	"	3	10
	Pale Red Bermuda	1883	"	1	10
	Duplicate	"	"	1	10
	Globe Madeira	"	"	1	10
	Duplicate	"	"	1	10
	Globe Madeira	1881	"	3	10
	Duplicate	"	"	3	10
	Golden Queen	1883	"	1	10
	Duplicate	"	"	1	10
	Flat Madeira	"	"	1	10
	Duplicate	"	"	1	10
	Flat Madeira	1882	Dec. 13, 1884	2	10
	Duplicate	"	"	2	10
	Flat Madeira	1881	"	3	10
	Duplicate	"	"	3	10
	Brown Tenerife	1883	"	1	10
	Duplicate	"	"	1	10
	Brown Tenerife	1882	"	2	10
	Duplicate	"	"	2	10
	Welsh	1881	"	3	10
	Duplicate	"	"	3	10
	White Silver Skin	1880	"	4	100
	Duplicate	"	"	4	100
Shallot Seed	Shallot Seed	1882	"	2	100
	Duplicate	"	"	2	100
Parsley	Fern Leaved	1883	"	1	100
	Duplicate	"	"	1	100
	Fern Leaved	1880	"	4	100
	Duplicate	"	"	4	100
	Champion Curled	1883	"	1	10
	Duplicate	"	"	1	10
	Champion Curled	1881	"	3	10
	Duplicate	"	"	3	10
	Hamburg	1883	"	1	10
	Duplicate	"	"	1	10
Parsnip	Sutton's Student	1881	"	3	10
	Duplicate	"	"	3	10
	Hollow Crown	1883	"	1	10
Pea	Duplicate	"	"	1	10
	Alpha	1883	"	2	5
	Duplicate	"	"	2	5
	*Duplicate	"	"	2	2
	do	"	"	2	2
	Kentish Invicta	"	"	2	5
	Duplicate	"	"	2	5
	*Duplicate	"	"	2	2
	do	"	"	2	2
	Philadelphia Extra Early	"	"	2	5
	Duplicate	"	"	2	5

TABLE OF GERMINATIONS — (Continued).

VEGETABLE.	VARIETY.	Year of growth.	Date tested
Pea	*Duplicate.....	1882	Dec. 18, 18
	do	"	"
	Harbinger	"	"
	Duplicate	"	"
	*Duplicate.....	"	"
	do	"	"
	Advancer	"	"
	Duplicate.....	"	"
	*Duplicate.....	"	"
	do	"	"
	Laxton's Prolific Long Pod.	"	"
	Duplicate	"	"
	*Duplicate.....	"	"
	do	"	"
	Laxton's Prolific Long Pod..	"	"
	Duplicate	"	"
	*Duplicate.....	"	"
	do	"	"
	Laxton's Marvel	"	"
	Duplicate	"	"
	*Duplicate.....	"	"
	do	"	"
	Telegraph.....	"	"
	Duplicate	"	"
	*Duplicate.....	"	"
	do	"	"
	Dwarf Grey Sugar	1881	"
	Duplicate	"	"
	*Duplicate.....	"	"
	do	"	"
	Tom Thumb	1882	"
	Duplicate	"	"
	*Duplicate	"	"
	do	"	"
Pepper	Large Squash.....	1875	"
	Duplicate	"	"
	Large Squash.....	1874	"
	Duplicate.....	"	"
	Large Squash.....	1888	"
	Duplicate	"	"
	Long Yellow Cayenne	1879	"
	Duplicate	"	"
	Long Yellow Cayenne	1874	"
	Duplicate	"	"
	New Cranberry	1882	"
	Duplicate	"	"
	New Cranberry ..	1881	"
	Duplicate	"	"
	New Cranberry. .	1890	"
	Duplicate	"	"
	New Cranberry.....	1879	"
	Duplicate.....	"	"
	Cherry	1882	"
	Duplicate.....	"	"
	Cherry	1870	"
	Duplicate	"	"
	Cherry	1871	"
	Duplicate	"	"
	Sweet Spanish	1882	"
	Duplicate	"	"
	Monstrous	1883	"
	Duplicate	"	"
Radish ...	French Breakfast..	"	"
	Duplicate	"	"
	French Breakfast ..	1882	"
	Duplicate.....	"	"

TABLE OF GERMINATIONS—(Concluded).

VEGETABLE.	VARIETY.	Year of growth.	Date tested.	Age of seed.	Number of seed used.	First seed sprouted; d/a.	Half sprouted; days.	Last sprouted; days.
Roquette	Roquette	1881	Dec. 18, 1884	8	10			
	Duplicate			8	10			
Salsify	Salsify or Vegetable Oyster..	1883	Dec. 18, 1884	1	10			
	Duplicate			1	10			
	Salsify or Vegetable Oyster..	1882	"	2	2			
	Duplicate			2	2			
	Salsify or Vegetable Oyster..	1881	"	3	10			
	Duplicate			3	10			
	Salsify or Vegetable Oyster..	"	"	3	10			
	Duplicate	"	"	3	10			
Scorzonera....	Scorzonera	"	"	3	10			
	Duplicate	"	"	3	10			
	Scorzonera	1885	"	19	10			
	Duplicate	"	"	19	10			
Skirret... ..	Skirret	1881	"	8	10			
	Duplicate	"	"	3	10			
Sorrel... ..	Sorrel	1885	"	19	10			
	Duplicate	"	"	19	10			
Spinach	American Savoy.....	1884	"	0	10			
	Duplicate	"	"	0	10			
Swiss Chard..	Swiss Chard	1888	"	1	10			
	Duplicate	"	"	1	10			
	Swiss Chard	"	"	1	10			
	Duplicate	"	"	1	10			
Spring Sprouts	Spring Sprouts	1880	"	4	10			
	Duplicate	"	"	4	10			
Squash	Perfect Gem	1882	"	2	5			
	Duplicate	"	"	2	5			
	Early Golden Bush.....	"	"	2	5			
	Duplicate	"	"	2	5			
	Green Striped Bergen.....	1881	"	3	5			
	Duplicate	"	"	3	5			
	Little Coconut	1880	"	4	5			
	Duplicate	"	"	4	5			
	Ohio	1881	"	3	2			
	Duplicate	"	"	3	2			
	New Marblehead	1883	"	2	2			
	Duplicate	"	"	2	2			
	New Marblehead.....	1874	"	10	2			
	Duplicate	"	"	10	2			

* At a lower temperature—65°-75°.

GERMINATION OF MAIZE.

Some careful experiments were made in order to determine the lowest temperature at which maize would germinate.

The apparatus used was a tight box about 12x16 inches square and five inches deep, lined on sides and bottom with a small lead pipe through which spring water was caused to flow. This box received about two inches depth of water in order to equalize temperatures by its mass, and in this water was floated the germination box, 9x14 inches square by three inches deep, and in which were the pockets or folds which contained the seed, and also about half inch depth of water. Through the tight cover of the outer box, a thermometer, which had been previously corrected by one of Green's Standards, was passed, its bulb entering the folds which contained the seed. Twenty kernels of corn of two varieties of each agricultural species, dents, flints, softs and sweets, and three varieties of pops were counted into the germinating pockets at 3 P. M. of December 2.

On December 13 and 14, our water supply failed and the temperature rose, thus concluding the trial.

The seed was taken from ears which were thoroughly air dried from hanging up since harvest in the station office, which is warmed by steam heat.

The figures obtained are given in the following table:

Date.	No. of observations.	Average temperature.	Extreme temperature noted.
Dec. 2.....	4	53.°	52.5-54.5
3.....	11	51.6	48.5-54.5
4.....	9	51.9	51.5-52.5
5.....	9	51.9	49.5-52.5
6.....	4	52.4	50.0-54.5
7.....	5	52.5	51.5-53.5
8.....	9	51.7	51.5-52.5
9.....	10	52.2	49.5-54.5
10.....	10	51.8	49.5-55.5
11.....	11	52.8	55.5-54.5
12.....	8	51.2	50.5-55.5
13.....	5	66.9	66.5-67.5
14.....	1	70.5	70.5-70.5

Strangely enough all the kernels germinated, the earliest in 141 hours, the latest in 281 hours, but we noted quite a variation which may be ascribed to race or variety. The following table makes this clear:

	141 hours.	150 hours.	161 hours.	165 hours.	171 hours.	185 hours.	189 hours.	195 hours.	209 hours.	218 hours.	222 hours.	233 hours.	237 hours.	243 hours.	255 hours.	281 hours.
<i>Flint Corns.</i>																
Wauashakum.....	0	4	6	6	14	20*	..	..	..	..	..	..	..	..	..	..
Duplicate.....	3	6	9	1	13	20*	..	..	..	..	..	..	..	..	..	..
Eight-rowed white...	0	0	4	4	5	13	16	17	20*	..	..	..	..	..	..	..
Duplicate.....	0	1	8	8	11	15	17	18	20*	..	..	..	..	..	..	..

<i>Dent Corns.</i>																
Adams early.	5.	8	15	15	17	20*	..	..	..	..	..	..	..	..	..	..
Duplicate.....	10	12	15	16	18	20*	..	..	..	..	..	..	..	..	..	..
Chester Co. mammoth	14	17	19	19	19	20*	..	..	..	..	..	..	..	..	..	..
Duplicate.....	17	18	20*	..	..	..	..	..	..	..	..	..	..	..	..	..

<i>Sweet Corns.</i>																
Narragansett....	0	0	0	0	0	0	0	0	1	1	3	5	5	7	18	20*
Duplicate.....	0	0	0	0	0	0	0	0	0	0	1	1	2	4	16	20*
Stowell's evergreen..	0	0	0	0	0	0	0	4	6	7	10	10	11	13	20*	..
Duplicate.....	0	0	0	0	0	0	0	2	6	8	10	10	10	11	20*	..

<i>Soft Corns.</i>																
Tuscarora.....	0	0	2	2	6	12	12	13	17	17	17	20*	..	..	..	..
Duplicate.....	0	0	2	2	3	6	6	7	13	14	16	17	17	17	20*	..
Zuni blue....	0	0	0	0	0	3	3	4	9	12	17	20*	..	..	..	..
Duplicate.....	0	0	0	0	0	3	3	4	11	11	12	17	17	19	20*	..

<i>Pop Corns.</i>																
Dwarf golden.....	12	15	18	18	20*	..	..	..	..	..	..	..	..	..	..	..
Duplicate.....	16	18	20*	..	..	..	..	..	..	..	..	..	..	..	..	..
Pearl.....	9	10	11	11	15	16	18	20*	..	..	..	..	..	..	..	..
Duplicate.....	7	9	12	12	15	17	18	20*	..	..	..	..	..	..	..	..
Egyptian.....	7	11	14	14	16	18	18	13	19	..	..	..	..	..	..	..
Duplicate.....	7	10	12	12	17	18*	..	..	..	..	..	..	..	..	..	..

From this table we can form the succeeding:

	Dents.	Pops.	Flints.	Softs.	Sweets.
First germination: hours.....	140	140	141	161	195
Half germinated: hours.....	140	150	171	209	255
All germinated: hours.....	185	209	209	255	281

From the 141st to the 161st hour the highest temperature was 51°.5, the extremes being 49°.5 and 51°.5, and yet eighty seeds germinated within these hours, thus proving that the germination temperature is below this point.

We also note that when all the dent corns had completed their germination, the 185th hour, but 85 per cent of the flints, none of the sweets, 30 per cent of the softs, and 93 per cent of the pops had germinated.

Interpolating the temperatures for the hours when the temperatures were not taken, and thus obtaining the average temperature

* 100 per cent.

for the day, we can add together these daily averages to obtain the following:

Sums of temperatures	306°	349°	400°	453°	505°	556°	630°
No. of days involved.	5.875	6.708	7.708	8.708	9.708	10.625	11.708

Per cent of germination at the various sums of temperatures for:

	306°	349°	400°	453°	505°	556°	630°
Dents.....	57	86	100				
Pops.....	50	74	93	100			
Flints.....	4	34	85	100			
Softs.....	0	5	30	62	92	100	
Sweets.....	0	0	0	16	32	92	100

On December 19 at 9 A. M., another trial was commenced with the same seed, additional precautions having been taken to secure a lower temperature, and twenty-five seed each of the varieties being used. A standard Centigrade thermometer, graduated to fifths was used, and the degrees reduced by calculation to the Fahrenheit scale. Temperature readings were taken, with but few exceptions, on the even hour, from 7 A. M. to 11 P. M.

DATE.	No. of observations.	Average temp. Deg.	Extreme temperatures. Deg.	Range of temp. Deg.
December 19.....	14	49.6	48.5-50.5	2.0
December 20.....	16	47.6	46.0-48.5	2.5
December 21.....	11	47.5	45.3-49.2	3.9
December 22.....	16	48.7	46.7-50.7	4.0
December 23....	17	48.8	48.5-49.6	1.1
December 24.....	17	48.7	47.8-50.0	2.2
December 25....	16	47.4	46.2-48.5	2.3
December 26.....	17	47.2	46.2-47.6	1.4
December 27....	17	47.7	46.0-49.4	3.4
December 28	16	47.2	46.0-50.0	4.0
December 29....	17	47.8	47.1-48.9	1.8
December 30.....	17	47.6	46.4-49.4	3.0
December 31.....	17	48.8	47.8-50.7	2.9
January 1.....	16	47.2	46.7-49.1	2.4
January 2....	16	47.3	44.7-49.2	4.5
January 3.....	17	47.6	45.3-50.0	4.7
January 4.....	16	48.8	46.4-50.0	3.6
January 5....	8	48.6	48.2-49.6	1.4

Interpolating the observations for the missing hours, we can estimate the temperature for each twenty-four hours of the trial, as below :

	Average temp. Deg.	Extreme temperatures Deg.	Variation in temp. Deg.
1st 24 hours.....	48.8	46.0-50.5	4.5
2d 24 hours.....	47.2	45.3-48.8	3.5
3d 24 hours.....	47.8	45.3-49.2	3.9

	Average temp. Deg.	Extreme temperatures. Deg.	Variation of temp. Deg.
4th 24 hours.....	49.4	47.1-50.7	3.6
5th 24 hours.....	48.6	48.3-49.1	0.8
6th 24 hours.....	48.2	46.0-50.0	4.0 Dents germinated.
7th 24 hours.....	47.4	46.0-48.5	2.5
8th 24 hours.....	46.9	46.0-47.6	1.6
9th 24 hours.....	47.7	46.0-49.4	3.4 Flints, Softs and Pops
10th 24 hours.....	47.7	46.5-50.0	3.5 germinated.
11th 24 hours.....	47.5	46.4-48.9	2.5
12th 24 hours.....	48.1	47.3-49.4	2.1 Sweets germinated.
13th 24 hours.....	48.7	47.4-50.7	3.3
14th 24 hours.....	46.5	44.7-49.1	4.4
15th 24 hours.....	47.3	45.3-49.2	3.9
16th 24 hours.....	47.7	46.0-50.0	4.0
17th 24 hours.....	49.1	47.8-50.0	2.2

The first germination noted was on the 168th hour, the average temperature being 48.2 deg., the extremes 45.3 deg., and 50.7 deg., and the variety the Chester County Mammoth Dent, the same that germinated among, if not the first, in the preceding trial. In the first trial the average temperature was 52.2 deg., and the time 141 hours, or expressing in tabular form :

	Germinated. Deg.	Av. temp. Deg.	Extremes. Deg.
1st trial.....	141 hours.	52.2	48.5-54.5
2d trial.....	168 hours.	48.2	45.3-50.7

According to Thome * the lowest temperature at which maize will germinate is 59° F., or according to Sachs † 48.9° F.

Between the 168th and 180th hour, the Chester county Mammoth germinated twenty-three kernels, or forty-six per cent, and during this interval the highest temperature was 47.6°, the lowest temperature 46.5°, the average temperature 47.4°, the range being but 1.1°. This goes to show that some varieties of maize can carry on changes involved in germination at a temperature of 47.6° F., or lower than the limits set by Sachs. During this last period of twelve hours, the thermometer was carefully read each hour, and the bulb happened to be placed within one of the pockets which contained this variety which showed first germination. From the 252d to the 264th hour, the average temperature 47.1°, the extremes 46.4° and 48.9°, no kernels germinated, but the dent corn had all been removed as germinated before this.

We will now offer the results of this germination trial in tabular form :

*Text Book of Structural and Physiological Botany, New York, 1878, p. 193.
†Text Book of Botany, by Julius Sachs, Oxford, 1882, p. 729.

	168th hour.	180th hour.	192d hour.	204th hour.	216th hour.	228th hour.	240th hour.	252d hour.	264th hour.	276th hour.	288th hour.
Flint Corns.											
Wauhakum.....	0	0	0	0	0	1	3	9	9	10	12
duplicate.....	0	0	0	0	0	1	2	7	7	9	13
Eight-rowed White....	0	0	0	0	0	2	2	14	14	18	19
duplicate.....	0	0	0	0	2	6	9	15	15	20	20
Dent Corns.											
Adams' Early	0	5	10	17	20	23	23	25*	..	..	..
duplicate.....	0	3	8	12	21	24	24	25*	..	..	..
Chester Co. Mammoth..	1	11	14	17	19	22	22	25*	..	..	..
duplicate.....	2	15	18	20	23	24	24	25*	..	..	..
Sweet Corns.											
Narragansett.....	0	0	0	0	0	0	0	0	0	0	0
duplicate.....	0	0	0	0	0	0	0	0	0	0	0
Stowell's Evergreen...	0	0	0	0	0	0	0	0	0	0	4
duplicate.....	0	0	0	0	0	0	0	0	0	0	4
Soft Corns.											
Tuscarora.....	0	0	0	0	0	0	1	3	3	3	6
duplicate.....	0	0	0	0	0	1	2	3	3	5	8
Zuni Blue.....	0	0	0	0	0	0	0	0	0	0	4
duplicate.....	0	0	0	0	0	0	0	0	0	0	5
Pop Corns.											
Dwarf Golden.....	0	0	0	0	0	1	2	6	6	8	11
duplicate.....	0	0	0	0	0	5	8	13	13	14	17
Pearl.....	0	0	0	0	0	4	5	9	9	12	16
duplicate.....	0	0	0	0	0	2	6	7	7	9	14
Egyptian.....	0	0	0	0	0	5	10	15	15	16	18
duplicate... ..	0	0	0	0	0	5	12	15	15	17	19
	300th hour.	312th hour.	324th hour.	336th hour.	348th hour.	360th hour.	372d hour.	384th hour.	396th hour.	408th hour.	
Flint Corns.											
Wauhakum.....	23	25*	.	.	..	..	..	.	..	..
duplicate.....	23	25*	.	.	..	..	..	.	..	..
Eight-rowed White....	23	23	0	0	0	0	0	0	25*	.	
duplicate.....	23	24	0	0	25*	..	..	.	..	..
Dent Corns.											
Adams' Early.....	..	..	.	.	..	..	..	.	..	..
duplicate.....	..	..	.	.	..	..	..	.	..	..
Chester Co Mammoth..	..	..	.	.	..	..	..	.	..	..
duplicate... ..	..	..	.	.	..	..	..	.	..	..
Sweet Corns.											
Narragansett.....	1	3	0	0	11	17	21	0	23	25*	
duplicate.....	3	4	0	0	10	18	22	0	24	25*	
Stowell's Evergreen....	11	17	0	0	18	21	23	0	25*	..	
duplicate.... ..	10	18	0	0	20	25*	..	.	..	..
Soft Corns.											
Tuscarora.....	9	16	0	0	22	25*	..	..	..	..
duplicate.....	14	19	0	0	20	24	0	0	25*	..	
Zuni Blue.....	9	14	0	0	15	17	21	0	24	25*	
duplicate.....	12	18	0	0	19	20	23	0	25*	..	
Pop Corns.											
Dwarf Golden.....	12	19	0	0	22	25*	..	.	..	..
duplicate.....	20	23	0	0	25*	..	..	.	..	..
Pearl..	17	21	0	0	23	24	0	0	25*	..	
duplicate..	15	20	0	0	23	24	25*	.	..	..
Egyptian.....	18	23	0	0	23	25*	..	.	..	..
duplicate.....	19	22	0	0	22	22	23	0	25*	..	

*100 per cent.

From the data obtained we can form the following table of germinations, the temperature noted being for the twelve hours preceding each count, and the numbers referring to the number of kernels removed at each examination. Curiously enough 100 per cent germinated in the total for each sort:

Hours.	Dent corn.	Flint corn.	Pop corn.	Soft corn.	Sweet corn.	Temperature.	
						Average.	Extremes.
168	3	0	0	0	0	47.3	46.2-48.5
180	31	0	0	0	0	47.4	46.5-47.6
192	16	0	0	0	0	46.5	46.0-47.6
204	16	0	0	0	0	47.9	47.1-48.9
216	17	2	0	0	0	47.7	46.0-49.4
228	10	8	22	1	0	47.1	46.5-47.8
240	0	6	21	2	0	48.3	47.6-50.0
252	7	29	22	3	0	47.7	47.1-48.9
264	..	0	0	0	0	47.1	46.4-48.9
276	..	12	11	2	0	47.6	47.3-48.0
288	..	7	19	15	8	48.5	47.8-49.4
300	..	27	6	21	17	48.7	48.0-50.7
312	..	6	27	23	17	48.6	47.4-50.7
324	..	0	0	0	0	47.1	46.7-49.1
336	..	0	0	0	0	45.8	44.7-47.4
348	..	1	10	9	17	47.9	46.4-49.2
360	..	0	7	10	22	46.7	46.3-48.5
372	..	0	2	7	10	47.9	46.0-50.0
384	..	0	0	0	0	47.6	46.4-49.1
396	..	2	3	6	6	49.2	47.8-50.0
408	..	..	..	1	3	49.1	48.2-50.0
	100	100	150	100	100		

The Dent corns germinated at a temperature whose average was 47°, and extreme 47.6°; the Flints, Pops and Softs at a temperature whose average was 47.1°, and extreme 47.8; the Sweets at a temperature whose average was 47.0° and extreme 48.5°.

Under similar circumstances the Dents commenced germination the 168th hour of the trial; the Flints the 216th hour; the Pops and Softs the 228th hour, and the Sweets the 228th hour.

The temperatures maintained for the 408 hours average 47.9°, the extremes being 44.7° and 50.7°.

The number of hourly observations recorded was 276. Interpolating the figures for the unobserved hours, we can form the following table, for the hours after the first twenty-four, which in all probability had but little part in the germination, but only in the soaking of the seed:

Number of hours at observed and interpolated temperature to first germination, after the first twenty-four hours:

Degrees.	Dent corns.	Flint corns.	Pop and Soft corns.	Sweet corns.
45 to 45½....	3	3	3	3
45½ to 46	2	2	2	2
46 to 46½....	13	19	19	22
46½ to 47	10	17	24	26
47 to 47½....	14	26	28	44
47½ to 48	16	27	30	43
48 to 48½....	23	29	29	41
48½ to 49	34	37	37	47
49 to 49½....	7	10	10	13
49½ to 50	10	10	10	10
50 to 50½....	8	8	8	9
50½ to 50¾....	3	3	3	3

Our experiments, in concluding, show that: 1st, all the kernels of an ear do not germinate with equal ease or with the same increment of temperature; 2d, that there is a difference in the time and temperature required between some of the agricultural species of maize; 3d, that the Dent corns germinated at a temperature of 47.6° or slightly below; Flints at a temperature of 47.8° or slightly below; Pops and Softs ditto; while Sweets required 48.5° or slightly below; 4th, that the increment of temperature required in our trials was far greater for the Sweets than for the other agricultural species.

A STUDY OF MAIZE.

In presenting our experiments with maize varieties, we will commence with tables representing such facts as admit of tabular form. Four hills of a kind were planted, in single rows, in order as numbered and catalogued. The blooming and silking records are those of the first plant to bloom or silk in each hill. The number of ears include only those that were sound. It may be remarked that rarely are so good ears produced in these small plantings, as when the planting is on a larger scale, as there is apt to be a deficiency in the variety pollen, and hence omission of kernels on the ears. In most cases, however, some good ears were produced, often many, and in a general view corresponded with the type of the variety planted. Attention is especially called to the variation in the periods of first bloom in the different hills of a variety. It seemed impossible to note the last bloom, but often as much variation was noticed between the blooming of the plants in a hill as existed between different hills, and thus the period of pollen flow was extended over a long interval. The same remark applies to the silking, and thus we can account for hybridization in crop between varieties whose bloom are not shown to be synchronous by the record.

The names used are those which came with the seed, except as to hybrids of station growth. We have given dates of edible maturity even in field corns, as offering a stage for comparison of growth. The planting was May 19.

TABLE.

Station No.		No. of plants.	No. of good ears.	Height of plant, ft.	Height of ears from ground, in.	Node from top at which top ear grows.	Edible maturity.	First hill.		Last hill.	
								First bloom.	First silk.	First bloom.	First silk.
1800	Sweet corn.	10	15	5½	16	4-6	August 9	July 16	July 17	July 25	July 26
1801		19	19	6¾	18	6-7	" 14	" 25	" 26	August 4	August 18
1802		16	16	6¾	22	6-7	" 20	" 31	August 1	August 7	August 11
1803		..	..	..	..	..	..	..	..	..	..
1804		31	30	5½	6	6	" 20	" 20	July 30	July 27	July 31
1805		20	17	5¾	18	5-6	" 8	" 20	July 19	July 24	July 25
1806		22	22	7	34	6-7	" 22	" 26	August 3	August 6	August 10
1807		16	17	7	30	6-8	" 20	" 26	July 29	August 3	August 6
1808		19	16	6¾	16	4-7	" 13	" 21	July 25	July 27	July 29
1809		..	..	..	18	4	" 8	" 13	" 18	" 16	July 23
1810		17	17	4	12	4-6	" 20	" 23	" 20	" 31	August 3
1811		21	6	6¾	30	4-6	" 20	" 31	August 1	August 4	August 7
1812		16	13	5	10	5-6	" 13	" 30	August 27	July 24	July 27
1813		14	13	4¾	8	4-5	July 27	" 11	July 11	July 13	July 16
1814		14	14	4¾	10	4-5	August 6	" 17	" 18	" 20	" 21
1815		2	16	4	4	4-5	August 8	" 13	" 23	" 20	" 21
1816		20	17	4	14	4-6	" 8	" 17	" 21	" 19	" 23
1817		..	13	4	7	4-6	July 27	" 8	" 8	" 18	" 23
1818		19	24	9	24	6-7	August 13	" 26	August 3	August 8	August 7
1819		13	24	9	18	4-5	August 13	" 13	August 25	July 25	August 29
1820		19	21	9	6	5-6	" 8	" 13	July 18	July 15	July 16
1821		16	18	6¾	13	4-6	" 11	" 20	" 20	" 26	August 1
1822		24	13	7	20	6-7	" 23	" 29	August 6	August 8	August 7
1823		13	16	6	36	7-8	" 17	" 23	August 1	August 4	" 9
1824		23	16	7	36	7-8	" 24	August 1	" 8	" 4	" 10
1825		18	9	9	34	5-6	" 16	July 25	July 31	July 31	" 5
1826		17	9	5¾	13	5-7	" 17	July 22	July 30	August 27	July 31
1827		15	9	5	16	7-8	" 19	" 28	August 2	August 3	August 7
1828		15	16	6	15	5-6	" 12	" 20	July 23	August 2	August 7
1829		22	14	6¾	29	6-7	" 23	" 20	August 7	August 8	August 8
1830		31	23	6¾	30	5-6	" 22	August 5	August 6	August 6	August 10
1831		15	11	6	30	5-6	" 22	" 3	" 6	" 6	" 7
1832		19	23	4¾	9	4	" 2	July 10	July 11	July 16	July 16

TABLE — Continued.

Station No.		No. of plants.	No. of good ears.	Height of plant, ft.	Height of ears from ground, in.	Node from top at which top ear grew.	Edible maturity.	First bill.		Last bill.	
								First bloom.	First silk.	First bloom.	First silk.
1833	Sweet corns	16	15	5	13	5-6	August 13	July 17	July 23	July 26	July 30
1834	Rochester, Sibley	25	22	6	24	6-6	" 20	" 28	" 30	August 2	August 5
1835	Squantum, Gregory	17	15	7½	30	6-8	" 25	August 3	August 9	" 8	August 12
1836	Small - French	23	28	5	15	4-5	" 7	July 17	July 23	July 20	July 24
1837	Gregory	24	21	6	30	5-6	" 22	" 28	August 1	" 31	August 1
1838	Black Sweet from white ear of Crosby's Early	24	26	6½	16	5-6	" 20	" 23	August 7	" 28	August 1
1839	Sweet tinged with red from unhusked ear of Pod corn	10	7	8	36	6-7	" 25	August 6	August 10	August 6	August 11
1840	Sweet from red unhusked ear of Pod corn	11	10	8	37	6-7	" 25	" 31	August 7	" 8	August 10
1841	Sweet Red pop from red pearl pop ear	23	23	8	24	4-6	" 13	July 21	July 24	July 23	July 29
1842	Red Sweet, same as 1840 but from white ear	13	11	8	45	6-8	" 22	August 8	August 8	August 15	August 18
1843	Narragansett, dark red, Station	24	12	5½	8	4-5	" 1	July 14	July 20	July 20	July 31
1844	Sweet Amber pop from New England type of pop	25	19	6	18	4-6	" 13	" 19	" 25	" 20	" 26
1845	White sweet from Black Mexican ear	18	11	6½	18	6-7	" 22	" 28	August 2	" 23	August 1
1846	Sweet red pop, same as 1841.	16	16	7	30	4-5	" 13	" 20	August 7	" 24	July 26
1847	Flint corns.	24	18	7	18	5-6	" 13	" 16	" 21	" 23	" 29
1848	Blue corn (from N. H.)	19	17	6½	20	4-6	" 7	" 15	" 21	" 16	" 24
1849	Canada twelve-rowed (from Quebec)	19	20	5	27	4-8	" 13	" 20	" 28	" 23	" 30
1850	Chinese Golden, Gregory	25	12	7	24	5-7	" 15	" 21	" 31	" 23	" 30
1851	Compton's Early, Ferry	22	17	5½	?	5-6	" 16	" 18	" 24	" 21	" 28
1852	Conn. White Flint, J. Gallup	20	19	6½	24	5-6	" 18	" 14	" 22	" 21	" 27
1853	Choice eight-rowed yellow, Thorburn	?	18	4½	10	4-5	" 12	" 10	" 12	" 12	" 14
1854	Forty Days, Gregory	16	14	7	24	6	" 18	" 23	" 29	" 20	August 4
1855	Improved Early Canada, Gregory	24	19	7½	24	4-8	" 17	" 23	" 29	" 29	August 1
1856	King Philip, Vaughan	20	14	7	18	5-6	" 16	" 16	" 21	" 24	July 20
1857	Landreth's Early Yellow, Landreth	18	15	7	20	5-7	" 17	" 17	" 23	" 25	August 5
1858	Longfellow, Gregory	18	16	7½	24	5-6	" 18	" 20	" 30	" 31	August 6
1859	Orange Flint, Thorburn	26	24	7	18	5-6	" 19	" 23	" 29	" 28	August 15
1860	R. I. White Cap, J. Gallup	24	20	8	26	6-7	" 25	August 4	August 13	August 7	August 15
1861	Rural Thoroughbred, Gregory	25	18	7	26	5-6	" 19	July 24	July 30	July 31	August 1
1862	Sanford, Gregory	18	17	4	18	6	" 16	" 26	August 20	August 20	July 31
1863	Top Over, H. L. Folger	18	17	4	18	6	" 16	" 26	August 20	August 20	July 31

[illegible]

TABLE - Continued.

Station No.		No. of plants	No. of good ears	Height of plant, ft.	Height of ears from ground, in.	Node from top at which top ear grew.	Earlike maturity.	First hill.		Last hill.	
								First bloom	First silk.	First bloom.	First silk.
1903	Mandan, whl	20	18	4½	6	8-5	August 2	July 11	July 15	July 21	July 22
1904	Mandan, yell	13	14	6	6	4-5	5	10	14	17	21
1906	Flat Dent.....	18	19	8	48	6-7	?	August 14	August 18	August 16	August 17
1906	White Dent	11	19	7¾	48	6-7	?	15	17	.....	.....
1907	Yellow Dent from husked ear of a Yellow Dent pod.	6	3	8½	48	6-7	?	14	17	.....	.....
1908	Station.....	21	17	8	48	6-7	Sept. 5	5	11	6	18
1908	Red Dent cren from unhusked Red Dent ear of pod	16	22	8	48	6-7	6	12	15	13	16
1908	White Flinty husk corn, Camden, N. J.....	17	16	6	24	6-6	August 20	July 24	July 26	.....	.....
1910	Maisze from Africa A. Landreth.....	13	13	4¾	9	4-5	18	18	18	.....	.....
1911	do	21	21	6	20	6-7	20	20	23	.....	.....
1912	do	13	18	6¾	24	5-6	20	19	31	.....	.....
1913	do	6	4	5½	24	4-5	18	27	31	.....	.....
1914	Corn from Dakota (from a visitor).....	13	24	3¼	15	4-5	2	14	14	.....	.....
1915	Dwarf Golden Pop, Gregory.....	19	17	4¾	20	3-4	18	27	30	.....	.....
1916	Egyptian Pop, Gregory	18	29	1¾	1	4	July 20	7	6	.....	.....
1917	Golden Pop, Station	16	18	7	20	5-7	August 20	23	30	.....	.....
1918	Golden Dew Drop Flint, Ferris	12	24	4	16	4-6	Sept. 13	21	28	.....	.....
1919	Japanese Striped (not Pop), Vaughan	17	29	5	16	4-6	August 19	21	28	.....	.....
1920	Nonpareil Pop, Gregory	13	15	6¼	20	4-5	21	22	27	.....	.....
1921	Silver-laced Pop, Gregory	33	26	5¾	18	3-5	18	19	26	.....	.....
1922	Amber Rice, Station.....	23	23	5¾	18	3-5	16	19	26	.....	.....
1923	Common White, Station	27	23	6	39	5-6	21	5	8	.....	.....
1924	Golden Pop, Station, failed	28	24	5	30	5-6	19	30	1	.....	.....
1925	Pale Red Pearl, Station	27	23	6	39	5-6	21	5	8	.....	.....
1926	Purple Rice from half red rice seed, Station	28	24	5	30	5-6	19	30	1	.....	.....

1927	Small White Pearl from Reddish Blush Pearl seed, Station	25	38	5	24	5-6	..	23	August 5	..	7	..	7	..	18
1928	White Pearl, Station	28	41	5½	24	5-6	..	23	August 4	..	11	..	11	..	11
1929	White Rice, from Amber red-tinged seed, Station ..	26	21	5½	30	4-5	..	18	July 29	..	30	..	1	..	1
1930	Yellow kernels from N. E. Pop, Station	24	23	5½	24	5-6	..	1	..	..	6	..	July 31	..	5
1931	Maize from Senegal, white, Landreth * .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1932	do yellow, Landreth * .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1933	do red, Landreth * .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..

* Failed to ripen.

We offer some notes relating to each planting, with such descriptions as will serve to identify, paying heed in general to diagnostic characters alone, in order that others, to whom our conclusions in regard to cross-fertilization may be found interesting, shall have the material for an independent judgment. Information of the character here attempted is especially desirable to those who would originate new and improved varieties, as well as to those who would grow varieties which shall be uniform in type, and deserving of the name of thoroughbred. So long as the universal belief exists that maize cross-fertilizes with every thing of the maize species so readily and certainly as to forbid separation and intensifying of good qualities, by a single grower, just so long the possibility and desirability of growing and improving our varieties will not receive judicious recognition on the part of the great mass of those who should be interested:

SWEETS.

1800. Alexander's Sweet (new; seed from Mr. Alexander):

Ears four to eight inches long. Ear-stalk small to medium; ear cylindrical, or slightly tapering, in the many-rowed; kernels crimped, a little pointed at tip. Two ears 8-rowed, eight ears 10-rowed, four ears 12-rowed, one ear 14-rowed. Color, white; cob, white.

* Some black sweet kernels; yellow, white and slate-colored flint.

1801. Amber Cream (Sibley):

Ears four to eight and one-half inches long. Ear-stalk small to medium; ear slightly tapering, rounded a little at butt and a little pointedly at tip. Color, flesh-red; cob, white. Four ears 8-rowed, five ears 10-rowed, and ten ears 12-rowed.

* Some few reddish, flint kernels. All the ears on type, except the 8-rowed, which may be considered slightly off, and which resemble the picture of Briggs' Early somewhat.

1802. Asylum (Thorburn):

Ears four to seven inches long. Ear-stalk medium small; ear slightly tapering, nearly cylindrical, rounding at butt and at tip. Color, white; white cob. Three ears 10-rowed, ten ears 12-rowed, three ears 14-rowed.

* Some few black sweet and white flint kernels.

1803. Black Mexican (Ferry):

Seed failed to vegetate.

1804. Improved Black Mexican (Alexander):

Ears four to seven inches long. Ear-stalks small; ear cylindrical, rounding slightly at butt, a little pointed at tip which does not fill well. Color, slate-black; cob, white. Sixteen ears 8-rowed, four ears 10-rowed.

* Some slate-black flint kernels — on some ears very numerous.

1805. Brighton Orange (Gregory):

Ears four to six and one-half inches long. Ear-stalks small; ear cylindrical, or very slightly tapering, rounding a little at butt, tip not covered. Color, white, with no tinge of orange; cob, white. Three ears 8-rowed, seven ears 10-rowed, seven ears 12-rowed.

* Some black sweet, white and yellow flint kernels; some ears half black.

Not the Orange Early, Fig. 350, *Rural New Yorker*, September 6, 1884.

1806. Burr's Improved (Hovey):

Ears three to eight inches long. Ear-stalks very small; ear tapering, rounded strongly at butt, bluntly rounded at tip which is well filled. Color, white; cob, white. Twelve to 20-rowed.

But one perfect ear; very late; in edible condition October 6.

* No indication of hybridization.

1807. Clark's Old Colony (Breck):

Ears three to seven inches long. Ear-stalk medium small; ears strongly tapering, rounded at butt, well filled at rather pointed tip. Color, white; cob, white. Fourteen to 20-rowed, or more.

* A very few yellow, dent kernels; a very few light purple, sweet.

This is Fig. 357, *Rural New Yorker*, September 13, 1884.

1808. Crosby's Early (Gregory):

Ears four to seven and one-half inches long. Ear-stalk medium to large; ear nearly cylindrical, rounded very slightly at butt, tips not well filled. One ear 8-rowed, one ear 10-rowed, six ears 12-rowed, three ears 14-rowed, five ears 16-rowed.

* Some few black sweet, and a very few yellow flint kernels.

1809. Dolly Dutton (Landreth):

Ears three to five inches long. Ear-stalk medium; ear cylindrical, or slightly tapering through crowding, scarcely rounded at butt, a little pointed toward tip. Color, white; cob, white. Seventeen ears 8-rowed, four ears 10-rowed, one ear 12-rowed.

* A few black sweet kernels, and white flint kernels.

1810. Early Dwarf (Thorburn):

Ears four to five and one-half inches long. Ear-stalk medium; ear cylindrical, rounding a little at butt, well filled at tip. Color, white; cob, white. Eight ears 8-rowed, one ear 10-rowed.

* A very few black sweet, yellow flint and white flint kernels; some few sweet kernels, purple-striped.

1811. Eight-Rowed Early (Station ?).

Ears five to ten inches long. Ear-stalks small; ear cylindrical, scarcely rounded at butt, well filled at tip. Color, white; cob, white. Nineteen ears 8-rowed, two ears 10-rowed.

Quite variable in different plants in respect to earliness. October 6, some ears ripe, others just past edible; yet others not yet at edible stage.

* A very few black sweet kernels; many yellow and white flint kernels.

1812. Early Genesee (Benson, Maule & Co.):

Ears four to seven inches long. Ear-stalk medium; ear tapering, rounded but little at butt, a little pointed at tip, which is not well filled. Color, white; cob, white. Five ears 8-rowed, four ears 10-rowed, four ears 12-rowed.

* Some ears nearly all flint-kernelled; some few purple and slate, sweet kernels.

1813. Early Marblehead (Gregory):

Ears four to six inches long. Ear-stalk medium to small; ears rather cylindrical, rounding a little at butt and tip, which fills well. Some ears white-kernelled and white-cobbed, and other ears red-kernelled and red-cobbed. Ten ears 8-rowed; three ears 10-rowed.

* Some few black sweet on both red and white ears; some white and yellow flint on white ears.

1814. Early Minnesota (Gregory):

Ears four to seven and three-quarter inches long. Ear-stalk small; ear cylindrical, rounding little at butt, rather pointed toward tip, which is well filled. Color, white; cob, white. Thirteen ears 8-rowed, one ear 10-rowed.

* Some few black sweet kernels; very many white and yellow flint kernels, and some few kernels which are flint on the chit face, and sweet on the opposite.

1815. Early Narragansett (Gregory):

Ears three to six and three-quarter inches long. Ear-stalk medium, ear cylin-

drical, scarcely rounded at butt, pointed toward tip, which is covered. Some ears very red, others pale red, but colors not mixed on same ear; cob, red. Twelve ears 8-rowed, three ears 10-rowed, one ear 12-rowed.

* Some few black, sweet kernels on pale red ears; few to many red flint kernels on all the ears, of same color as the sweet.

1816. Early Narragansett (Landreth):

Ears four to eight inches long. Description same as in 1815. Eleven ears 8-rowed, four ears 10-rowed, two ears 12-rowed.

* Red flint kernels in small numbers.

1817. Early Orange (Sibley):

Ears four to seven inches long. Ear-stalk small; ears cylindrical, rather open at butt, scarcely rounded at butt, rounded at tip, which is well filled. Some ears white, with white cobs; other ears slightly red, tinged with reddish cobs.

* Many white flint kernels on the white ears; white and white and red-striped on the red-tinged ears, and some kernels flint on the chit side and sweet on the reverse.

This does not seem to be Fig. 350 of *Rural New Yorker*, September 6, 1884.

1818. Egyptian Sweet (Gregory):

Ears three to six inches long. Ear-stalks medium; ear tapering, rounding evenly at butt, rather abruptly at tip, which is not well filled. Color, white; cob, white. Twelve-rowed mostly.

* Very many white and yellow kernels, not indented, but dent in structure; a few dented kernels.

1819. Egyptian Sweet (Ferry):

Ears four to seven inches long. Ear-stalk medium small; ear cylindrical, rounding very slightly at butt, well filled at tip. Color, white; cob, white. Twenty-one ears 8-rowed, three ears 10-rowed.

* Yellow and white flint kernels very numerous; a few black sweet kernels.

This is identical with Eight-rowed Early, No. 1811.

1820. Ford's Early (Gregory):

Ears three to six inches long. Ear-stalk small; ear cylindrical, or but slightly tapering, rounded a little at butt, rather abruptly at tip. Color, white, with white cob in most ears; just a suspicion of red tinge on other ears, and a reddish cob. Seventeen ears 8-rowed, four ears 10-rowed.

* Some few black sweet kernels; quite a number of white and yellow flint kernels.

1821. Golden Sweet (Gregory):

Ears four to six inches long. Ear-stalk smallish; ears quite variable, the 8-rowed cylindrical, the 10 and 12-rowed slightly to much tapering. Color, golden-yellow; cob, white. Nine ears 8-rowed; five ears 10-rowed, 4 ears 12-rowed.

* Yellow and white flint kernels numerous; the corneous matter very thin on the top of the flint kernels in the 12-rowed.

1822. Hickox (Thorburn):

Ears three to seven inches long. Ear-stalk medium; ear tapering, rounded at butt, rather abruptly at tip. Color, white; cob, white. Mostly 12-rowed.

* A few yellow sweet kernels; some white flint kernels.

1823. Landreth's Sugar (Landreth):

Ears three to seven inches long. Ear-stalk small medium; ear tapering, rounding strongly at butt; in section often oval. Color, white; cob, white. Many-rowed.

* Some yellow and white dent kernels.

1824. Mammoth (Sibley):

Ears seven inches long, but one ripening. Ear-stalk medium; ear tapering, rounded at butt; tip not covered. Color, white; cob, white. Sixteen-rowed.

* Some few white flint kernels.

1825. Marblehead Mammoth (Gregory):

Ears five to seven inches long. Ear-stalk large; ear slightly tapering, rounding little at butt; kernels loose. Color, white; cob, white. One ear 10-rowed, one ear 14-rowed, three ears 16-rowed, three ears 18-rowed, one ear 22-rowed.

* Many white and yellow flint kernels; some few yellow sweet kernels.

Earlier than No. 1824. The ear much larger diameter.

1826. Moore's Early Concord (Gregory):

Ears five to six and one-half inches long. Ear-stalk medium; ear slightly tapering, rather rounded at butt, rather pointed at tip. Color, white; cob, white. One ear 10-rowed, four ears 12-rowed, two ears 14-rowed, one ear 16-rowed.

* Some white and yellow flint kernels, and a few yellow sweet kernels.

1827. Ne Plus Ultra (Station):

Ears six to seven inches long. Ear stalk small; ear strongly tapering, rounded strongly at base, pointed toward tip. Color, white; cob, white. Many-rowed, but the rows irregular and confused.

* White and yellow dent kernels quite numerous.

1828. Old Colony Sweet, Clark's (Parker & Gannett):

Ears three and one-half to six inches long. Ear-stalk medium; ear slightly tapering. Two types of ears, one clearly the Early Narragansett, the other resembling Orange Sweet, No. 1829. Cob, red on the reddish ears, white on the white ears. Five ears 8-rowed, seven ears 10-rowed, four ears 12-rowed.

* White and yellow flint kernels on white ears, flesh-colored flint kernels on reddish ears.

Not Clark's Old Colony Sweet, No. 1807, but Orange Sweet of *Rural New Yorker*, September 6, 1884.

1829. Orange Sweet (Parker & Gannett).

Ears four to six and one-half inches long. Ear-stalk medium; ear tapering, rows not very regular, rounded a little at butt, evenly pointed at tip, which is well filled. Color, white; cob, white. Three ears 12-rowed, seven ears 14-rowed, two ears 16-rowed, two ears 18-rowed.

* White and yellow flint kernels.

This is identical with Clark's Old Colony Sweet, No. 1807.

It is possible that 1828 and 1829 were wrongly labelled, the correct labels being reversed. I can scarcely imagine a mistake in planting on our part.

1830. Potter's Excelsior (Gregory):

Ears four to five and one-half inches long. Ear-stalk medium small; ear slightly tapering, a little rounded at butt, rather irregularly rowed; kernels not loose. Color, white; cob, white. Ten to 12-rowed.

* A few purple sweet kernels; a number of yellow and white flint kernels; a very few soft kernels.

1831. Potter's Excelsior (Sibley):

Ears three to six inches long. Ear-stalk and ears similar to 1830, but some ears with a reddish cob and a different style of kernel. Color, white; cob, white, with exceptions as noted. Ten to 12-rowed.

1832. Pratt's Early (Gregory):

Ears three and one-half to five and one-half inches long. Ear-stalk small, or medium; ear cylindrical, or tapering in the lower third, scarcely rounded at butt, where it is usually irregularly kernelled, top well filled. Kernels crinkled, distinctly rounded on summit and on sides. Color, white; cob, reddish. Twenty-six ears 8-rowed, two ears 10-rowed.

* A few black sweet kernels, a number of yellow and white flint; a few kernels, both flint and sweet, that were not striped.

1833. Rochester (Sibley):

Ears four to six and one-half inches long. Ear-stalk small to medium; ear cylindrical and scarcely rounded at tip; well filled at tip. Color, white; cob, white. Twelve ears 8-rowed, two ears 10-rowed, one ear 12-rowed. Same as Early Eight-rowed, No. 1811.

* A few yellow and white flint kernels.

1834. Squantum (Gregory):

Ears three to seven inches long. Ear-stalk small to medium; ear tapering strongly, a little rounding at butt. Color, white, but more amber than most; cob, white. Fourteen to 16-rowed.

* Yellow and white dent kernels quite abundant.

1835. Stowell's Evergreen (Gregory):

Ears four to seven inches long. Ear-stalk small; ear tapering; rounded at butt, well filled at tip. Kernels loose. Color, white; cob, white.

* Some few yellow sweet kernels; quite a number of yellow and white dent kernels.

1836. Tom Thumb (Sibley):

Ears four to six inches long. Ear-stalk medium or largish; ear cylindrical, not rounding at butt; abruptly rounding at tip. Color, white; cob, white. Sixteen ears 8-rowed; six ears 10-rowed; one ear 12-rowed.

* Quite a number of black and slate colored sweet kernels, some light purple, white and yellow soft kernels, a very few white flint kernels.

1837. Triumph (Thorburn):

Ears four to six inches long. Ear-stalk small; ear cylindrical, but often tapering through added rows toward butt; a little rounded at butt; rather pointed at tip, which is not well filled. Color, white; cob, white. Thirteen ears 8-rowed; seven ears 10-rowed; one ear 12-rowed.

* Black and slate colored sweet kernels; white and yellow flint kernels.

1838. Black kernels from ear of Crosby's Early (Station):

Ears five to eight inches long. The majority of the ears of the Black Mexican type, other ears of Crosby's Early type. Kernels black and white about equally mixed on the ears. Quality and form of ears very firm. Eighteen ears 8-rowed; nine ears 10-rowed; eight ears 12-rowed.

* Black sweet, white sweet, blackish flint and slate colored flint kernels, also white flint and yellow flint kernels, but unfortunately the occurrence or absence on the different types not noted at harvest.

1839. Sweet kernels from red-tinged sweet ear grown from pod seed (Station):

Ears four to eight inches long. All ears of one type. Ear-stalk small; ear tapering strongly at the tip, which is pointed; rounding at the butt; rows straight, kernels loose, crimped almost and quite wrinkled. Color almost orange tinged white; cob, red. Fourteen to 16-rowed.

* A few white dent kernels.

1840. Sweet kernels from Red Dent, unhusked ear of pod corn (Station):

Ears three to five and one-half inches long. Ear-stalk small. Ear tapering, rounding strongly at butt; a little pointed toward tip; kernels crinkled and wrinkled very deeply, rather square; a sulcus between rows. Seven red, with red cob; and three white ears, with red cob. Sixteen to 22-rowed.

* Red ears all uniformly kernelled; white ears with a few purple sweet and yellow sweet kernels, and yellow dent kernels.

1841. Red Sweet Pop, taken from a red rice pop ear (Station):

Ears four to six inches long. Ear-stalk small. Ears tapering; rounded strongly at butt; rather pointed toward tip. Ten ears were red sweet pop, with red cobs; nine ears white sweet ears, with white cob; and nine ears were white rice pop with white cob. The kernels all of the rice type.

* The red sweet pop ears had a few red rice pop kernels.

The white sweet pop had some purple and slate and blackish sweet kernels, and purple, yellow, white and blackish rice pop kernels.

The white rice pop had blackish and slate-colored sweet and yellow, purple and blackish rice pop kernels.

1842. Sweet kernels from a White dent ear, raised from a red unhusked ear of pod corn. Same crop as 1840, but a different selection (Station).

Ears five to six and one-half inches long. One podded ear, five red sweet ears, five white sweet ears. The podded ear apparently a sweet corn. Unpodded ears very attractive, ear stalk small, ear tapering, rounding strongly at butt, a little pointed toward tip. The red ears had red cob, the white ears white cob. 18 to 20-rowed. Kernels long, narrow, squarish, deep, a sulcus between the rows.

* Some red dent kernels on the red ears, and white dent kernels on the white ears: some white sweet kernels, striped slightly with purple.

1843. Narragansett, very dark red (Station).

Ears five to seven inches long, of Narragansett type

* Red flint kernels, some white shaded, others much deeper red than the sweet reds, may be called brownish red.

1844. Sweet pop from amber ear of New England pop type, but nearly a flint variety (Station).

Ears five to seven inches long. Ear stalk medium to small; ears cylindrical, scarcely rounded at butt, a little pointed toward the tip. Kernels crimped, a little oval. Color, white; cob, white. Six ears 8-rowed, thirteen ears 10-rowed.

* Some white, yellow and purple flint kernels, and a few black sweet kernels.

1845. White sweet kernels from ear of Black Mexican (Station).

Ears three to seven inches long. Some ears a reddish sweet, resembling very closely the Amber Cream, and 12-rowed. The balance of the ears white kernelled, but slightly tapering, scarcely rounded at butt, well filled at tip, and apparently of the 8 and 10-rowed Black Mexican types, but white. Three ears 8 rowed, six ears 10-rowed, two ears 12-rowed.

* Black, purple, spotted yellow and white flint kernels, and a few black sweet kernels on both types.

1846. White Sweet Pop, grown from dark red, sweet kernels, taken from a red pearl pop ear (Station).

Ears five to seven inches long. Ear stalk small; ear tapering; rounded at butt. Of two sorts, one resembling the rice pop, the other the pearl pop, but the kernels sweet in both; the kernels of different sizes. Color, white; cob, white. Eight ears 12-rowed, seven ears 14-rowed, one ear 16-rowed.

* The large kernelled ears have yellow, slate and white flint kernels; the small kernelled ears white, yellow and slate pearl pop, and white, yellow and slate pearl pop kernels, and both sorts have some purple and blackish, sweet kernels.

FLINTS.

1847. Blue corn (Hanover, N. H.).

Seed sent as a survival of the apparently obsolete Blue corn, formerly grown in New England, but mixed.

Ears five to nine and one-half inches long. Ear cylindrical in the 8-rowed, and tapering in the 12-rowed, thus presenting the not uncommon circumstance of two kinds of corn grown customarily as one variety in the same field. The 8-rowed is of the type of No. 1852; the 12-rowed of the type of Early Dutton. Color, copper-yellow; cob white. Eight ears 8-rowed, seven ears 10-rowed, three ears 12-rowed.

* Some blue and slate flint kernels, and very many flint kernels striped with red.

1848. Canada (from P. Q.):

Ears six to eight inches long. Ear-stalk medium to largish; ear tapering, scarcely rounded at tip, pointed at tip, which is thoroughly filled. Color, golden yellow; cob, white. Two ears 8-rowed, six ears 10-rowed, nine ears 12-rowed, but the 8-rowed are of the Early Canada, cylindrical type.

* Some slate-colored flint kernels.

Identical with No. 1856.

1849. Chinese Golden (Gregory):

Ears four to six inches long. Ear-stalk small, ear very strongly and evenly tapering, rounding completely to stalk and butt, and rather pointed toward tip; kernels very roundish. Color, golden yellow; cob, white. Four ears 12-rowed, six ears 14-rowed, nine ears 16-rowed, one ear 18-rowed.

* Some slate-colored flint kernels; one kernel appears to be a Dent in structure, but not dented. A line of corneous matter at side barely discriminates from a Soft.

Resembles No. 1910 very closely, and probably identical.

1850. Compton's Early (Ferry):

Ears seven to nine inches long. Ear-stalk medium large; ear tapering, rounding but slightly at butt, but swollen toward butt and rounded at tip; kernels small. Color, golden yellow; cob, white, large. One ear 10-rowed, eight ears 12-rowed, three ears 14-rowed.

* Many slate-colored flint kernels.

1851. Connecticut White (J. Gallup, Ct.):

Ears six to eight inches long. Ear-stalk medium to small; ear cylindrical, tapering at lower fourth, a little rounded at tip, tip bluntly rounded, well capped; kernels large, shallow. One white ear, sixteen ears mostly yellow; cob, white. Sixteen ears 8-rowed, one ear 12-rowed.

* Some slate-flint kernels; very many yellow kernels.

1852. Choice Eight-rowed Yellow (Thorburn):

Ears six to nine inches long. Ear-stalk small; ear cylindrical, but tapering at the lower third, and swollen at butt by the addition of irregular kernels; slender. Color, bright golden yellow; white cob. Seventeen ears 8-rowed, two ears 10-rowed.

* No hybridization observable.

1853. Forty Days Early (Gregory):

Ears four to six and one-half inches long. Ear-stalk small; ear cylindrical, but liable to taper through openness between pairs of rows toward butt. Color, white; cob, white. Sixteen ears 8-rowed, one ear 10-rowed, one ear 12-rowed.

* Many yellow flint, a few slate, blackish and pink-striped flint kernels.

1854. Improved Early Canada (Gregory):

Ears six to eight and one-half inches long. Ear-stalk small to medium; ear cylindrical, rounded, compressed at butt, bluntly rounded at tip, a little pointed at lower fourth. Golden yellow; cob, small, white. Thirteen ears 8-rowed, one ear 10-rowed.

* No appearance of hybridization.

Answers exactly to the Waushakum, No. 1865.

355. King Phillip (Vaughan):

Ears six and one-half to nine and one-half inches long. Color, copper yellow, and ears answering in every other respect to 1854. Sixteen ears 8-rowed, one ear 10-rowed, two ears 12-rowed.

* No appearance of hybridization.

356. Landreth's Earliest Yellow (Landreth):

Ears seven to ten and one-half inches long. Identical with No. 1848. Eight ears 8-rowed, four ears 10-rowed, two ears 12-rowed.

* No appearance of hybridization.

357. Longfellow (Gregory):

Ears six to nine inches long. Ear-stalk medium small; ear rather open at butt, which gives a slight tapering, otherwise the description the same as of the Waushakum, No. 1865, except a slightly larger ear. Fifteen ears, all 8-rowed.

* No appearance of hybridization.

358. Orange Flint (Thorburn):

Ears four to nine and one-half inches long. Except a slightly larger kernel, similar to Waushakum, No. 1865, and seems to be the same as Golden Dew-drop (Thorb.), as grown on station plats. Fifteen ears 8-rowed.

* No appearance of hybridization.

359. Rhode Island White Cap (J. Gallup, Ct.)

Ears four to six inches long. Ear-stalk small; ear cylindrical; rounded

slightly at butt, abruptly capped at tip; ear apt to be slightly curved. Color, white; cob, white. Twenty-three ears 8-rowed; one ear 10-rowed.

* Some few yellow flint kernels, and occasionally a purplish flint kernel.

1860. Rural Thoroughbred (Gregory):

Ears six to twelve inches long. Ear-stalk medium to largish; ear cylindrical type, but tapering always through the great openness always found between the pairs of rows, which give a coarse appearance to the ear. Scarcely rounded at butt, not filling at tip. Color, white; cob, white. Twenty ears 8-rowed, but of these but seven had kernels.

* Very many yellow flint kernels.

1861. Sanford (Gregory):

Ears four to ten inches long. Ear-stalk smallish; ear cylindrical in type, but usually tapering through added kernels toward butt, where it rounds slightly; abruptly rounded at tip, which does not fill. Kernels white on summit; horny white below; cob, white. Seventeen ears 8-rowed; one ear 10-rowed.

* Some yellow flint kernels.

1862. Topover (from Nantucket):

Ears six and one-half to eight and one-half inches long. Ear-stalk very small; not as large as a pipe-stem, and set in a hollow, caused by the rounding of the kernels at butt; butt and tip rounded alike, so as to be difficult to discriminate at first sight when the stalk is broken off; ear cylindrical; kernels rounded at summit, closely compressed at sides; golden yellow, with a scarcely lighter shade at summit; cob, white. Fifteen ears 8-rowed; two ears 10-rowed. A wonderfully distinct and remarkable variety.

* No appearance of hybridization.

1863. Waushakum (Gregory):

Ears seven to eight and one-half inches long. Fourteen ears 8-rowed.

1864. Waushakum (Home seed):

Ears seven to ten inches long. Sixteen ears 8-rowed.

1865. Waushakum. Harvested at edible maturity (Station):

Ears six to nine inches long. Nineteen ears 8-rowed.

The same description to Nos. 1863, 1866 and 1865. Ear-stalk small to medium; ear cylindrical; rather compressed toward butt, tapering slightly in lower fourth, well capped at tip. Color, golden yellow; cob, white.

* No appearance of hybridization.

1866. Dark red seed from Eight-rowed purple (Station):

Ears seven to nine and one-half inches long. Ear-stalk medium small; ear slender; cylindrical but swollen at butt; well covered at tip. Eight dark purple red ears with red cob, eight orange yellow ears with white cob. Five ears 8-rowed and three ears 10-rowed of the red, and nine ears 8-rowed of the yellow.

* No hybridization apparent on red ears. White and slate-colored flint kernels in the yellow ears.

1867. Slate-colored flint from ears of Golden Sweet (Station):

Ears four and one-half to nine inches long. Ear-stalk small, ears tapering; scarcely rounded at butt; rather pointed toward tip. Color exceedingly mixed. Cob, white. Nineteen ears 8-rowed; two ears 10-rowed; one ear 12-rowed.

* Yellow, white, yellow red striped, white red striped, slate, purple, olive, greenish and blackish flint kernels; white, red, yellow and black sweet kernels; all the colors occurring in several shades.

1868. Flinty kernels from Sibley's Pride of the North dent (Station):

Ears four to seven inches long. Sixteen flint ears, of which ten ears are 8-rowed; six ears 10-rowed; five dent ears, of which one ear is 8-rowed; two ears 10-rowed; two ears 12-rowed. The flint ears correspond to Waushakum Flint; the dent ears to Sibley's Pride of the North.

* A very few purplish dent kernels on dent ears; a very few slate-colored flint kernels on flint ears. One flint ear has indented kernels, but the structure is that of a flint.

1869. Waushakum. (Station seed grown in rows with other kinds in 1883):

Ears six to nine and one-half inches long. Twenty ears 8-rowed. The description same as for No. 1865.

* Some very few slate-colored flint kernels. One ear red orange, of the color of King Philip, but a lighter shade.

1870. Waushakum (Station, grown with other varieties for two years):

Ears six to nine inches long. Twenty-four ears 8-rowed. Description same as for No. 1865.

* Some few white kernels on some ears. Otherwise no marks of hybridization.

1871. Yellow flint from early 8-rowed sweet ear (Station):

Three dent ears five and one-half to six inches long; one rice pop ear three inches long; three pearl pop ears six to six and a half inches long; sixteen flint ears four to nine inches long. The dent ears are all Adams Early except the color is yellow. The Rice pop is yellow, many-rowed and on type, or cone formed. The pearl pop ears are yellowish, many-rowed and on type. The Flint ears are all of the type of the White Flint No. 7, page 46 of Second Annual Report of the New York Agricultural Experiment Station, except in being yellow.

* Quite a number of yellow sweet kernels on the dent ears. Some white sweet kernels of rice type on the Rice pop ear. Some few slate-colored pearl pop and quite a few sweet pearl pop kernels, and orange flint of the Pearl pop ears. A few orange, white, slate and black flint kernels on the flint ears; some ears nearly free from a mixture.

1872. Yellow flint from a sweet Amber Rice pop ear (Station):

Fifteen flint ears five to eight inches long, and eight to 12-rowed; five rice pop ears four to six inches long and many-rowed. The flint ears of Early Dutton type, even the 8-rowed, which became 12-rowed towards butt. Color, orange yellow. The Rice pop ears all on type.

* One flint ear with slate and white flint, and white and black sweet kernels, all in small numbers. The fourteen remaining flint ears show no indication of hybridization. The pop ears have a few purplish and slate rice pop kernels.

DENT CORNS.

1873. Adams' Early (Gregory):

Ears three to six inches long. Ear stalk small; ear very slightly tapering in upper part, but strongly below, rounding at butt. Color, white; cob, white. One ear 10-rowed, thirteen ears 12-rowed, one ear 16-rowed.

* Some very few purple dent kernels.

1874. Benton Dent (Station):

Ears five to nine and one-half inches long. Ear-stalk medium; ear cylindrical in upper part, pointing a little in the lower fourth. A strong tendency to openness between the pairs of rows, and the section of the ear squarish. Kernels very broad. Color, light yellow; cob, white. Fourteen ears 8-rowed.

* But one ear off type, this one with small ear-stalk, rounding at butt, and mostly flint, there being some few indented kernels, barely of the structure of a dent. Otherwise than this no hybridization to be detected.

1875. Blount's Prolific (Gregory):

Ears four to eight inches long. Ear-stalk smallish; ear cylindrical; a deep more or less broad sulcus between the rows which show a tendency towards arrangement in pairs. Color of kernels, white on summit, horny white below; cob, white. Nine ears 10-rowed, three ears 12-rowed.

* Some few yellow dent kernels.

1876. Chester County Mammoth (Gregory):

Ears six to eight inches long. Ear-stalk small; ear slightly tapering, rounded strongly at butt; a rather deep but narrow sulcus between the rows. Kernels yellow on summit, orange below; cob, reddish. Sixteen to 18-rowed.

* No hybridization apparent.

1877. Chester County Mammoth (Ferry):

Ears five to eight inches long. One ear 14-rowed, three ears 16-rowed, one ear 18-rowed. Description identical with No. 1876.

* No hybridization apparent.

1878. Cloud's Early Mammoth Chester (Landreth).

Ears four to eight inches long. Eighteen to 20-rowed. No difference perceptible between this and Nos. 1876 and 1877.

* No hybridization apparent.

1879. Hundred Day (Gregory):

Ears four to eight inches long. Some ears are the Wisconsin Yellow of Vaughan, other ears are larger, with a broader sulcus between the rows, and larger ear stalk. Color, yellow-orange; cob, red. Four ears 12-rowed, three ears 14-rowed, three ears 16-rowed, three ears 18-rowed, one ear 20-rowed.

* Some white dent kernels.

1880. Little Red Cob (Sibley):

October 14; too unripe for preservation or description.

1881. Maryland White Gourd Seed (Landreth).

Ears four to seven inches long. Ear-stalk small; ear slightly tapering, rounding strongly at butt, evenly at tip, which is not filled. Color, white, on summit, horny-white on lower part of kernel. Sixteen to 18-rowed.

* Some few kernels yellowish-white dent on tip, yellowish-orange below; occasionally a few purple-stripes on the white kernels.

1882. Queen of the Prairie (Gregory):

Ears four to six inches long. Ear-stalk small; ear slightly tapering, well rounded at butt, a little pointed at tip, which is uncovered. Color, yellowish-orange; cob, reddish. Two forms of ear, the one with deep, thin kernels, flat on top, the true type; the other with thick rounded kernels, with a dimple, the sulci between rows quite prominent. Fourteen to 18-rowed.

* Some few white dent kernels.

1883. Rural Union (Rural New Yorker):

Ears three to eight inches long. Cob, red; otherwise the same description applies as for Benton Dent, No. 1874. Twelve ears 8-rowed, two ears 10-rowed.

* The ears vary considerably in color, some being orange-yellow on summit of kernel, and deep, horny-orange below; others yellowish-white on summit, and horny-orange below; some reddish-white on top, and horny-buff below, etc., etc. Otherwise no hybridization apparent.

1884. Sibley's Pride of the North (Gregory).

Ears four to seven and one-half inches long. Two forms of ears, the one like Queen of the Prairie, true type, No. 1882, the other with a pronounced sulcus. The two numbers 1882 and 1884 produced the same kind of ears as if mixed seed of the two had been used in each case.

* Some few white dent kernels.

1885. White dent kernels from unhusked ear of pod corn; the ear had white, sweet kernels, and was grown from a red ear of pod corn.

Ears five to nine inches long. Five red dent, unhusked ears, with red cob; five white dent unhusked ears, with red cob, and one yellow flint ear, with white cob. The dent ears like those grown in 1882 and 1883 from pod corn. The flint ears, Early Dutton.

* Red, sweet, kernels, on red ears; white, sweet, and yellow dent on the white ears, white sweet and white flint on the flint ear.

1886. White dent kernels from a white, sweet ear, from unhusked ear of pod corn (Station):

Nine white, dent ears, five to eight inches long, one husked ear, four inches long. Eight ears tapering, resembling the dent ears of No. 1885; one ear resembles Blount's Prolific 10-rowed; the husked ear cone form, long husks. Cob, red, on eight of the nine dent ears, white on the Blount's Prolific.

* White sweet kernels on all the ears, and red-striped and golden sweet, and red-striped dent on the one Blount's Prolific ear.

1887. Dent-like kernels from Waushakum. Those kernels that were cut were flint in structure, but the corneous matter so thin at top of kernel as to admit of indentation (Station):

Eleven dent ears, four to six inches long. One ear 10-rowed, five ears 12-rowed, three ears 14-rowed, two ears 16-rowed. Five flint ears, six to eight inches long. One ear 8-rowed, three ears 10-rowed, one ear 12-rowed. The dent ears all of Adams' Early form, but yellow. The flint ears all Waushakum.

* On the dent ears an occasional purple dent kernel; no other mark of hybridization. On the flint ears a few kernels with summit of a different and lighter shade of orange, and slightly indented, true dents in structure.

1888. Dent, seed from Stowell's Evergreen Sweet (Station):

(Stowell's Evergreen had last year a few yellow and white indented kernels. A later examination shows that some of these supposed dents were of the Soft corn structure.)

Nine Dent and Soft ears four to nine inches long. Five ears 12-rowed, three ears 14-rowed, one ear 16-rowed. Six flint ears four to seven inches long, one ear 10-rowed, 2 ears 12-rowed, one ear 14-rowed, one ear 16-rowed, one ear 18-rowed. One ear Soft Pearl Pop four inches long, 16-rowed. One ear Rice Pop four inches long, 16-rowed.

Of the eight ears reserved for a more thorough examination, two so-called dents proved to be 12-rowed Tuscarora; one ear was white dent of the Pod corn type; one Reddish Dent, same type; one ear soft corn of the 12-rowed Mandan type; one ear White Pearl Pop; one ear Rice Pop; one ear Soft White Pearl Pop.

* On the Tuscarora ears, sweet kernels and some few purple-striped soft and a few yellow soft kernels. On the White Dent a few white sweet and yellow soft kernels, and more white soft kernels. On the Reddish Dent ear some orange sweet kernels. On the Mandan ear some white sweet and yellow soft kernels. On the Pearl Pop ear some white sweet and yellow pop kernels. On the Rice Pop ear some white sweet kernels. On the Soft Pearl Pop ear some yellow, rice-like soft pop and yellow sweet kernels.

SOFT CORNS.

1889. Mandan or Squaw (Station):

Ears three to seven inches long. Ear-stalk medium; ear nearly cylindrical, or tapering through added rows at butt; some ears all flint, others all soft. Color, mixed; cob, white. Ears 10 to 12-rowed, but mostly too irregular for accurate count.

* No appearance of flint kernels on the soft, or soft kernels on the flint ears, but careful cutting of many kernels develops some flint kernels on the soft ears; blue, slate and purplish kernels common, white predominating, and many yellow.

1890. Red River (seed from Manitoba in 1882, Ontario in 1883):

Ears four to five and one-half inches long. Ear-stalk small; ear cylindrical, not rounded at butt, rather blunt at tip; kernels not compressed, almost spaced, yet not loose on the cob. Color, white; cob, white.

* On some ears, purple, blue, yellow, mottled and red-splashed white soft kernels. No flint or sweet.

1891. Tuscarora (Henderson):

Ears four to nine inches long. Ear-stalk rather large; ear cylindrical in type, but tapering, in fact, through openness between pairs of rows at butt; kernel broad, often slightly indented, not filling well at tip. Color, white; cob, red. Nineteen ears 8-rowed.

* Some few yellow and white purple-lined, and a very few purple soft kernels.

1892. Tuscarora (Landreth):

Ears six to nine inches long. Seventeen ears 8-rowed, two ears 10-rowed. Same description as No. 1891.

* Some few yellow, blue, blue purple-lined and white purple-lined soft kernels.

1893. Tuscarora (Station):

Ears four to nine inches long. Fourteen ears 8-rowed, two ears 10-rowed, five ears 12-rowed; the 8 and 10-rowed all Tuscarora type, mostly white kernelled; the 12-rowed, reddish-kernelled flint of the Early Dutton type, but shorter.

* The Tuscarora type ears have yellow, blue and purple soft kernels. The flint ears have pink and reddish and brownish kernels intermixed so as give a uniform color to the ear through their blending, and sweet and soft kernels of the same color.

1894. Znni Blue (F. H. Cushing, Zuni Indians):

Ears seven to twelve inches long. Ear-stalk smallish; ear slightly tapering, rounding at summit, not well filled at tip. Color, blue; cob, white. Four ears 14-rowed, three ears 16-rowed, one ear 18-rowed. Some kernels indented.

* Some light purplish, yellow and white soft kernels. Some of the kernels have a sensible yet small quantity of corneous matter on the sides, and yet the seed was all soft.

1895. Zuni Black (Cushing):

Ears five to ten inches long. Ear-stalk small; ear tapering, rounding at butt, tapering cleanly to well-filled tip. Fourteen black-purple ears, with fine purple cobs, two blue ears, with white cob. In the purple-black ears the kernels polygonal through pressure, the sides not parallel in the same plane, the chit very large. The blue ears correspond with No. 1894. Three ears 12-rowed, six ears 14 rowed, five ears 16-rowed, two ears 18-rowed.

* No hybridization apparent in the black ears. In the blue ears, white, yellow, purple and variously striped soft kernels.

1896. Zuni Purple (Cushing):

Ears four to eight inches long. Ear-stalk small; two forms of ears. The one like No. 1895, the other fusiform, that is tapering from a point at the upper third towards the butt, and towards the tip. Kernels rounded at butt. The ears show several forms of coloring. Some ears glossy lemon yellow, with a few purple and slate kernels, some red kernelled throughout, some blackish purple. Cob, purple on the purple ears, white on the others.

* Colors very mixed in all but the red and purple ears, all soft kernelled.

1897. Zuni White (Cushing):

Ears six to nine inches long. Ear-stalk small. Two forms of ears; the one fusiform as in No. 1896, the other tapering as in 1895. Three ears 12-rowed, three ears 14-rowed, six ears 16-rowed, one ear 18-rowed, one ear 20-rowed.

* The pink purple ears, seven in number, have cobs faintly tinged with purple, and show no mixture save an occasional darker purple kernel. The white ears are also seven in number; some are purple tinged, with white and slate-colored soft kernels, others are white, and have purple, slate, yellow and speckled kernels of soft corn.

1898. Zuni White, purple speckled (Cushing):

Ears four to eight inches long. Two forms of ears; the one nearly cylindrical scarcely rounded at butt, 12-rowed, with medium ear-stalk; the other tapering towards butt and tip as in No. 1896, and rounded at butt, the ear-stalk small. Color variable, white predominating in some ears, blue and deep purple in others; cob, white. Twelve to 16-rowed.

* Kernels all soft, speckled kernels very abundant, usually purple on white ground, but various shades of purple, blue, yellow, and pink are to be found, as well as pure white.

1899. Zuni Yellow (Cushing):

Ears four to nine inches long. Ear-stalk smallish. Two types of ears, the one tapering towards butt and towards tip, the other tapering from butt, the first rounded at butt, the latter not rounding, or but very slightly. Color, yellow; cob, white. Two ears 12-rowed, six ears 14-rowed, ten ears 16-rowed, one ear 18-rowed, one ear 20-rowed.

* A few slate, white and purple soft kernels.

1900. Mandan or Squaw; reddish brown flint kernels (Station):

Ears four to seven inches long. Ear-stalk smallish; ears cylindrical, scarcely rounded at tip, all on type. Colors, various, some red-brown ears, other ears mostly blue.

* The red ears apparently all flint, and no mixture of colors of kernels. The

blue ears have soft, flint and sweet kernels, the colors yellow, white, and blue flint, blue and white soft, and white and black sweet.

1901. Mandan or Squaw. Pink flint kernels (Station):

Ears four to eight inches long, same style as No. 1900, but apparently all flint. Chocolate pink the most abundant color, but ears covered with kernels of various colors, except the bright red, which are of uniform color throughout.

* No hybridization other than the colors to be observed.

1902. Mandan or Squaw. Red flint kernels (Station):

Ears three to seven inches long. Eleven 8-rowed ears, mostly yellow, all flint and of the type of Early Canada; nine ears 10-rowed, and of the Mandan type, but all flint.

* One red ear has one deep red kernel with a distinct white cap, which extends about one-third of the way down, sharply defined. One ear has kernels white on the chit side, red on the reverse, the tip showing the red and white in halves; some sweet kernels also of the same description. The remaining ears have slate, white, purple and yellow kernels, mostly flint, but some soft.

1903. Mandan or Squaw. White flint kernels (Station):

Ears five to seven inches long. Some ears copper yellow, others yellow and white, all flint and of King Philip or Early Canada type; cob, white. Thirteen ears 8-rowed, five ears 10-rowed.

* Some white, purple and black sweet kernels, some purple slate, white and yellow flint kernels.

1904. Mandan or Squaw. Yellow flint kernels (Station):

Ears five to nine inches long, and all of the Canada and Early Canada type, mostly yellow. Cob, white. Eleven ears 8-rowed; three ears 10-rowed.

* White, slate, copper-stained, purple and mottled flint kernels, white and yellow sweet kernels, and variously colored kernels of soft on some ears, but not on others.

POD-CORN

1905. Flat Dent (J. W. N., Camden, N. J.)

Ten-podded ears, four of which were 8-rowed and six were 10-rowed. Nine unpodded ears, four of which were 8-rowed, and five were 10-rowed. Ear-stalk medium for a pod; ear tapering a little; heavily husked. The unpodded ears of Blount's Prolific type.

* No hybridization observed.

1906. White Dent (J. W. N., Camden, N. J.)

Ten ears podded, nine ears unpodded. Three of the podded ears slender, cylindrical in upper portion, tapering in lower; five to six inches long; closely and thinly podded; quite ripe; seven-podded ears, strongly tapering or cone form; four to six inches long; long husks; very unripe. The nine unpodded ears resembled Blount's Prolific.

* No hybridization apparent.

Nos. 1905 and 1906 came from J. W. N., Camden, N. J., and said to have appeared spontaneously in a crop of Blount's Prolific.

1907. Yellow dent from husked ear of a yellow dent pod (Station):

Ears four to six inches long. Ear-stalk small; ears cone-shaped, with long husks. Very unripe.

* Not examined for hybridization on account of the husks.

1908. Red dent from unhusked red dent ear of pod corn (Station):

Sixteen unhusked red ears, five to seven inches long - one red husked ear two and one-half inches long. All the ears of the type of the seed.

* No appearance of hybridization.

1909. White flinty dent (J. W. N., Camden, N. J.)

Ears three to eight inches long. Four-podded ears, very unripe. Nine unpodded, but will answer to keep; nine unpodded, but below edible condition.

Eight to 10-rowed. The unpodded ears are Blount's Prolific in appearance; the podded ears are very white husked; irregularly rowed; lightly but closely husked kernels, resembling Blount's Prolific as closely as could be expected from a podded ear; same origin as Nos. 1905 and 1906.

* No hybridization detected.

AFRICAN CORN.

1910. Maize from Africa. A. Flint seed. (Landreth.)

Ears five to seven inches long. Small to medium ear-stalk; ear strongly tapering; rounded at butt; rather pointed at tip. Color, golden orange; cob, white. Appears identical with Chinese Golden, No. 1849. Many-rowed.

* No appearance of hybridization.

1911. Maize from Africa. E. I. Flint seed (Landreth):

Ears three to six inches long. Resembles Chinese Golden, No. 1849, in general shape, but the color is a duller orange. Two forms of ear, one to which the description of No. 1910 applies; the other with a stronger rounding at butt; a sulcus between the rows and a minute sharp, stiff spine at the point of insertion of the silk, like rice pop, but the kernel full on top; light orange on top; deep orange below, and a dent by structure. Six ears 12-rowed; four ears 14-rowed; two ears 16-rowed; one ear 18-rowed; cob, white.

* A very few white and slate black flint kernels.

1912. Maize from Africa. E. 2. Flint kernels (Landreth):

Ears four to seven inches long; many-rowed; cob, white. Corresponds in description to No. 1910, but the ears white instead of orange yellow.

* Some yellow flint kernels.

1913. Maize from Africa. E. 3. Flint seed (Landreth):

Ears three to seven inches long. Three forms of ears. One flint, resembling No. 1910; another dent of similar form; the third a dent, slightly tapering; rounded at butt to small ear-stalk; a pronounced sulcus between the rows, and a very small, sharp stiff spine to each flat kernel; cob, white.

* No hybridization apparent; the ears all being of one form and color of kernel.

MISCELLANEOUS.

1914. Dent corn from Dakota (a visitor).

Ears six to seven and one-half inches long. Description same as Benton Dent, No. 1874, except cob light-yellow above, dark-orange below, or whitish on summit, and orange below.

* No appearance of hybridization, except in color, as noted.

POP CORNS.

1915. Dwarf Golden (Gregory):

Ears two to four and one-half inches long. Ear-stalk small; ear slightly tapering, rounding evenly and strongly at butt and tip. Beautiful bright golden orange color; cob, white; twelve or more rowed, often irregular.

* No appearance of hybridization.

1916. Egyptian pop (Gregory):

Ears four to seven inches long. Ear-stalk small; ears strongly tapering, rounding strongly at butt. Kernels sharp-pointed, rice shape, all corneous matter and chit. Color, pure translucent white; cob, white. Many-rowed.

* No appearance of hybridization.

1917. Golden Pop (Gold):

Ears three-quarters of an inch to two inches long. Ear-stalk small. The short ears oval, the larger ones evenly rounded at butt and tip. Color bright golden-orange; cob, white; kernels roundish. Ten to 14-rowed.

* No appearance of hybridization.

MISCELLANEOUS.

1918. Golden Dew Drop Flint (Ferry):

Ears six to nine inches long. Ear-stalk medium; ears cylindrical, but swollen slightly at butt, and pointed towards tip third, slender. Color, golden orange; cob, white. Eighteen ears 8-rowed.

* One slate flint kernel.

1919. Japanese Striped (Vaughan):

Ears three to three and one-half inches long. Ear-stalk small; ear somewhat fusiform, rounding from the center toward butt and tip. Kernels orange-white on top, orange below, roundish. A very light flint by structure, and can be classed as intermediate between flint and dent, but kernels not dented. Very late. Cob, white. Twelve to 16-rowed.

* No appearance of hybridization.

POP CORNS.

1920. Nonpareil pop (Gregory):

Ears four and one-half to seven and one-half inches long. Ear-stalk small to medium; ears cylindrical, but often swollen toward butt, and pointed toward tip, very slender, evenly kernelled. Color, white; cob, white. The kernels usually show a narrow band of visible starch upon section. Twenty-five ears 8-rowed, four ears 10-rowed.

* Some golden-yellow kernels.

1921. Silver-laced Pop (Gregory):

Ears four to six inches long. Ear-stalk small; ear slightly tapering, rounded a little, but distinctly at butt; rows straight, usually not filling well at tip. Color, silvery-white; cob, white. Twelve to 16-rowed.

* Some few yellow kernels.

1922. Amber Rice Pop (Station):

Eleven flint or common pop ears, four to seven inches long; seven Rice pop ears, four to seven inches long; seven Pearl pop ears, three to five and one-half inches long. The flint ears 12 or more-rowed; tapering, swollen at butt, the type of Early Dutton, but smaller. Kernels the size of No. 1920 or slightly larger, of flint structure, but the corneous matter strongly developed. Color, light-yellow. The Rice pop ears are many-rowed, amber color, tapering toward cone form, rounded strongly at butt, and of a light-yellow color; cob, white.

* Some white kernels of the type on all the ears.

1923. Common White Pop (Station); Nonpareil (of Gregory):

Ears four to seven inches long. Four red ears, the rest amber and yellow. Ears cylindrical; the 8 and 10-rowed of Nonpareil type, the 12 and 14-rowed of Pearl pop or silver-laced type; cob, white. Ear-stalk medium to small; five ears 8-rowed, seven ears 10-rowed, twelve ears 12-rowed, two ears 14-rowed.

* Some sweet, and white and yellow pop, about evenly mixed, in all but the red ears.

1924. Golden Pop (Gold):

Same as 1917. But one plant vegetated, and no records kept at harvest.

1925. Pale-red Pearl Pop (Station):

Ears four to five and one-half inches long. Seventeen red pearl pop ears, and sixteen white pearl pop ears; the cobs red tinted on the red, white on the white ears. Ears very slightly tapering, rounded at butt, and at tip, ear-stalk small. Kernels very deep, small surfaced and closely set, extremely corneous and hard. Color, pearly.

* No hybridization on the red ears; some yellow kernels on the white ears, and some kernels with dead, white tops, all of type.

1926. Purple Rice from buff-red Rice (Station):

Ears two to six inches long. Six red rice pop ears, many-rowed, and red-tinted cobs; five red common pop ears, 8-rowed, and with red-tinted cobs; thirteen Amber rice pop ears, many-rowed, and with white cob. The rice pop ears all on

type, small-stalked, strongly tapering, strongly rounding at butt, and rice-kernelled. Color, pearly. The red common pop have all cylindrical ears, swollen at butt, through irregular addition of kernels. Amber rice all of the same pattern as the Red rice pop.

* No hybridization to be noted on most of the ears. On one poor, red ear, not counted in the crop, a few red, sweet kernels; on another a few dark-yellow kernels of the type of the rest of the kernels on the ear.

1927. Small White Pearl from Reddish-blush Pearl (Station):

Ears three to five inches long. Ear-stalk small; ears cylindrical or but very slightly tapering, rounding at butt, a little pointed at tip, which does not fill well. Kernels very deep, mosaic like, and handsome. Two ears red pearl, four blush pearl, and thirty-two white pearl. Cob, red-tinged to the reddish ears; many-rowed.

* An occasional yellow yearl kernel in the white and blush ears.

1928. White Pearl Pop (Station):

Ears three to five inches long. Ear-stalk small, ears cylindrical, compressed and rounded at butt, rounded at tip. Kernels deep. Color, pearl-white; cob, white; many-rowed.

* An occasional lemon-yellow kernel.

1929. White Rice Pop from Amber red-tinged seed (Station):

Eighteen ears rice pop, three ears pearl pop. Some of the rice ears are buff, others red, others amber. The pearl pop ears amber-pearl, approaching common pop. All on type.

* One slate pop kernel on a pearl pop ear. A few dented rice pop kernels, soft in structure, on an amber rice pop ear. A few red, sweet rice kernels on a red rice pop ear.

1930. Yellow kernels from New England Pop (Station):

Ears three to nine inches long. One ear red pearl, twenty-two ears New England pop. The red pearl on type, as also the New England, whose color is yellow; cob, white.

* Some white kernels on New England pop.

MISCELLANEOUS.

1991. White maize from Senegal (Landreth):

1992. Yellow maize from Senegal (Landreth):

1993. Red maize from Senegal (Landreth):

* Did not ripen sufficiently to harvest.

Before discussing the cross-fertilization of maize, we must define our agricultural species, and note other circumstances, which necessarily affect our conclusions.

FLINT CORN, that agricultural species in which the split kernel shows three structures, the chit, visible starch, and corneous matter surrounding.

DENT CORN, that agricultural species in which the split kernel shows the chit, visible starch, extending to the summit, and corneous matter upon the sides.

SOFT CORN, that agricultural species in which the split kernel shows only the chit and visible starch, the corneous matter being absent.

POP CORN, that agricultural species in which the split kernel shows only the chit and corneous matter, or a very fine line of visible starch enclosing the chit.

SWEET CORN, that agricultural species in which a section shows only the chit and the corneous matter, this latter translucent and horny appearing.

Flint kernels cannot always be recognized by their external appearance. They may, through the thinness of the corneous matter at the summit, become dimpled through the shrinkage of the interior in ripening, and the bending in of the thin, corneous summit. They may also readily be confounded with the Softs, especially when both occur on the same ear. A cross-section, however, will always discriminate.

Dent kernels often appear flinty, but in these cases the corneous matter at the sides curves forward so as to nearly include the starchy interior, especially in the strongly arched terminal kernels of a cob, but in these cases a section will usually indicate a point at which the starchy interior approaches the surface. Dent kernels may be of several kinds: in one the corneous matter at the face and back approach the summit so that the dent becomes a crease, the softer starchy interior shrinking within its hard boundary; in the second kind the corneous matter is thinned on the front and back, and the dent becomes broadened; in yet another the corneous matter may end at some distance from the summit, and thus produce a different sort of dent.

Soft corn kernels are of several types. In the eight-rowed type a dent often appears, usually a crease, but sometimes a dimple. It is only by cross-section that the true type can be ascertained with certainty. Another type of soft corn is the many-rowed, deep-kernelled, cone-formed. The only samples of ears that I know of this type is the Mummy corn; the kernels of this resemble a dent, but are true softs. Other examples of this type may be found on ears of the Evergreen Sweet type as produced by cross-fertilization.

Pop corns can only be certainly distinguished when they are of their true corneous type. At other times we must presume their recognition from the excess of corneous matter, and from their size.

Sweet corn kernels admit of determination at sight.

Of these types sweet and flint may appear occasionally in the same kernel, the division being distinctly marked as the front sweet, the back of the kernel flint. One instance of a soft on a flint kernel, the base of the kernel red flint, the tip capped with a white soft, the division line distinct; and one case of a dent with the face sweet, the back dent, has been noted.

It is often difficult to avoid error in describing kernels of current hybridization, as, not wishing to destroy the ears at once, we must judge of the character of the kernels by the eye, verifying by the use of the knife in a number of kernels, and if the verification is absolute in the tried instances, to assume that our judgment is correct in the rest. With the best of care, however, some errors must occasionally occur from this source.

A more frequent error is in comparing names rather than samples.

Thus Old Colony Sweet, obtained from Parker and Gannett in 1884 was entirely different from the Old Colony Sweet of Breck; so also Egyptian Sweet of Ferry from Egyptian Sweet of Gregory, and Egyptian of 1883 and Squantum of 1883 were also different from the varieties grown under the like name in 1884. In our later studies we described and arranged the sweet corn in a series of articles, which appeared in 1884, and, accepting these descriptions as accurate, our 1883 growing of sweet corn was defective in naming; thus Squantum was not this variety at all; Egyptian was the Eight-rowed Early, of a late type, and Ne Plus Ultra was grown from seed of Station growth, and undoubtedly hybridized. It is very probable that other discrepancies of like character occurred, but which our knowledge of varieties did not enable us to recognize, and this may account in part for difference in results in the comparison of the two years' trials.

The data we possess for our present study is that furnished by 127 varieties growing together in one plat in 1883, and 134 varieties grown in like manner in 1884, the yields carefully studied ear by ear, and the observations noted at the time, and afterward verified by sample ears selected for the purpose, and retained for further examination.

Under our circumstances of planting, does the pollen freely circulate throughout the plat? This is an important question for decision as upon it depends the value of negative observations. The flow of pollen is very uneven, both in commencement and continuance, one plant frequently blooming even eleven or twelve days before another plant of the same row, or even hill, and the duration of the bloom often extended, in some cases, far more than in others. It is probable, therefore, that with the few exceptions of the very early and very late sorts, there might have been a free commingling of the pollen. That this was actually the case was evidenced by the effects produced by the test or "witness" varieties planted for this purpose. The Black Mexican Sweet, and the Blue Mandan or Squaw varieties furnish a color of kernel so distinct that its presence mixed with kernels of other corns can be safely recognized; and this color and this kernel were found generally in the crops, irrespective of distance from the "witness" plants. We must therefore believe that some plant of almost every variety had the opportunity to cross with each other variety, if there was no resistance.

There are two kinds of hybridization to be considered in the study of maize. One, the current fertilization, whereby the influence is shown by change of kernel, either in color or structure, the same year. The second is the hybridization which only shows itself in the crop grown from the crossed kernels, and which does not appear in the current crop. These two kinds must receive attention separately.

We will divide our material into two divisions; the one the ears grown from seed obtained from seedsmen, or presumably a named variety; the other, the seed obtained from hybridized samples, or

from a source which infers hybridization. First, we will offer the results of our study with named seed, or presumably little hybridized seed, which justifies the following statements in regard to current hybridization.

PROPOSITION 1. *Under the conditions of ordinary seed, maize does not in general show the effects of current cross-fertilization, the exception being the sweet corns, which exhibit the influence of current foreign pollen very readily.*

FLINT CORN. — Ten varieties in 1883; no kernels of other agricultural species; *i. e.* all flint. Nineteen varieties in 1884; all flint kernels, with a possible exception of an obscure dent by structure in *Chinese Golden*, Greg.

DENT CORN. — Twelve varieties in 1883, all kernels dent; eleven varieties in 1884; all dent.

SOFT CORN. — One variety in 1883, and some flint kernels; nine varieties in 1884, and all soft kernels.

POP CORN. — One variety in 1883, all pop kernels; five varieties in 1884, and all pop kernels.

SWEET CORN. — Twenty-seven varieties in 1883, of these twenty-four had flint kernels, and three were all sweet; in 1884, thirty-five varieties, of these one all sweet; five had dent kernels, and twenty-nine had flint kernels.

We are therefore justified in the conclusion.

The next question is as to what is the effect of hybridization upon the crop of the succeeding year.

PROPOSITION 2. *The agricultural species of corn have a strong tendency to resist cross-fertilization with each other, the average resistance in our trials being 66 per cent success; 34 per cent failure.* The full significance of this can only be seen by examining our evidence in detail.

We note here at the beginning that certain varieties appear to resist hybridization very strongly. In 1882, seed of Waushakum corn was planted alongside many other varieties, and exposed to hybridization from many sorts. No influence of the foreign pollen was observed in the crop. The next year, or 1883, seed from this plant was used on a half acre, which in turn, was greatly exposed to hybridization from over one hundred sorts. No influence of the foreign pollen, either of 1882 or 1883 was observed. In 1884, the same condition of things, the seed from last year's crop being used. The 1884 crop was as purely on type as the home bred seed, which has been carefully bred in Massachusetts for a number of years. *Per contra*, one plat of Waushakum corn was alongside the Minnesota Dent in 1882. In 1883, seeds from both plats yielded a crop of corn, partly Minnesota Dent, and partly Waushakum Flint, there being no intermediates.

The result gained from the use of seed grown under conditions that almost compelled hybridization, some being currently hybridized kernels taken from ears of other agricultural species, is shown below :

FLINT CORN. — In 1883, nine varieties of these three yielded flint and dent ears ; one flint dent and soft ears ; and five were flint ears ; in 1884, seventeen varieties, of which three produced flint and dent ears ; one flint and pop ; one flint, dent and pop ; one flint and soft, and eleven all flint ears.

DENT CORN. — In 1883, thirteen varieties ; of these, four produced flint and dent ears ; one sweet and flint ears ; and six gave all dent ears ; in 1884, ten varieties, three yielding dent and flint ears ; one dent flint soft and pop ears, and six producing dent ears only.

SOFT CORN. — In 1883, six varieties, all yielding soft ears ; in 1884, two varieties, both yielding flint and soft ears.

POP CORN. — In 1883, nineteen varieties, of these, seven produced pop and flint ears ; twelve yielded all pop ; in 1884, eight varieties, one of which yielded pop and flint, and seven all pop ears.

SWEET CORN. — In 1883, five varieties, two of which yielded pop and flint ears ; one the pop ear, and two sweet ears ; in 1884 ten varieties, all produced sweet ears.

The summary of these observations are :

26 Flint cross-breds produced 16 times their own species.

23 Dent cross-breds produced 12 times their own species.

8 Soft cross-breds produced 6 times their own species.

27 Pop cross-breds produced 19 times their own species.

15 Sweet cross-breds produced 12 times their own species.

PROPOSITION 3. *Cross-bred corn has a greater tendency to current cross-fertilization than purely bred corn, on the face of our evidence.*

There is one peculiarity of this cross-bred seed which is worthy of mention, and this is that the progeny of these cross-bred seed show a stronger tendency toward receiving current cross-fertilization than pure seed, thus :

FLINT CORN. — In 1883, nine varieties, one of which had flint and dent kernels, and eight all flint ; in 1884, fourteen varieties, of these three had sweet and flint kernels ; two had flint and dent kernels, two had soft, flint and sweet kernels, two had flint, sweet and pop kernels, and five all flint kernels.

DENT CORN. — In 1883, thirteen varieties, one of which produced sweet, dent and flint kernels, and twelve all dent kernels ; in 1884, six varieties, of which one had flint and dent ; one had sweet and dent ; one had sweet, soft and pop kernels ; one had sweet, flint and dent ; and two had all dent kernels.

SOFT CORN. — In 1883, six varieties, of which six produced soft and flint kernels; in 1884, two varieties, of which one had soft and flint kernels, and one had soft, flint and sweet.

POP CORN. — In 1883, nineteen varieties, of which seven had pop and sweet kernels; one sweet, pop and flint, and eleven all pop kernels; in 1884, eight varieties, of which two had sweet and pop kernels; one had sweet, soft and pop, and five had all pop kernels.

SWEET CORN. — In 1883, five varieties, of which one had sweet and flint kernels; three sweet and pop, and one had sweet, flint and pop; in 1884, ten varieties, of which four produced sweet and dent kernels; four produced sweet and flint; one sweet and pop, and one sweet, flint and pop kernels.

Summarizing the number of varieties of presumed pure seed and presumed hybridized seed, and expressing the number of yields in which there was no mixture of kernels of different agricultural species, we have:

Presumed pure seed yielded.	Presumed hybridized seed yielded.
29 Flint corns 20 times pure.	23 Flint corns 13 times pure.
28 Dent corns 23 times pure.	19 Dent corns 14 times pure.
10 Soft corns 9 times pure.	8 Soft corns 0 times pure.
6 Pop corns 6 times pure.	27 Pop corns 16 times pure.
62 Sweet corns 4 times pure.	15 Sweet corns 0 times pure.
Per cent pure 54.	Per cent pure 46.

In the two kinds of seed that we used, we noted a difference in the character of the hybridizations. With presumed pure seed, the sweet corns received current cross-fertilization from the flints and dents and the other agricultural species resisted current cross-fertilization, with the possible exception of one case of flint receiving a doubtful dent, and soft receiving flint. In the case of the seeds of presumed hybrid character, we have a number of instances of flint corns bearing sweets, doubtful dents and soft kernels of dent corns bearing sweets and doubtful flint kernels; of soft corns bearing flint kernels; of pop corn bearing sweet and flint kernels; and of sweet corns bearing flint, dent and pop kernels. In many of these cases of opposite results occurring with the hybridized seed than with the pure seed we have a probable explanation in the incorrect classification of the ears observed. Thus a sweet corn grown in the midst of flint pollen will lose through current hybridization nearly all its sweet kernels, and will present an ear mostly flint, but with a few sweet kernels interspersed. A soft corn grown in the midst of flint varieties may have most of its kernels changed to flint or dent, and will be classed with flint or dent ears. It is quite probable that with pure seed of the agricultural species, the sweet and the soft corns are the only species that ordinarily change kernels under current hybridization, and it is more than probable that the exceptions observed in our showing came through the seed not being purely bred, and thus throwing ears of a type that received the kernels which gave us our naming, while the true kernels became considered as interlopers on account of their infrequency.

PROPOSITION 4. *There is a resistance to current hybridization between the races of a species.*

Observations of a similar character have also been made within the agricultural species upon the effects of current cross-fertilization between the races, and of cross-fertilization upon the succeeding crop. This study, however, is more uncertain on account of the difficulty of recognizing the crossed types. Had we varieties so distinct in color and kernel as to be at once recognized, such varieties would serve us a touch-stone, and enable us readily to classify. The nearest approach to such a variety that we have is the Black Mexican, among sweet corns. Yet, as I wrote in my classification of sweet corns, published in the *Rural New Yorker* in 1884: "Probably there are two distinct varieties, which are always sold in a mixed crop, through not being recognized, the one earlier than the other," and hence if two races of the Black Mexican are present in our seed, we must expect some confusion in interpreting its occurrence upon ears of other corn through the current influence of its pollen. We, however, will undertake the illustration, using the notes of 1883 and 1884, with the exception of the 1883 notes which were made upon incorrectly named samples.

In studying examples of ears from many sources, and representing hundreds of local names and collections, I think I can recognize three races of corn within each agricultural species, and each race holding a parallel relation in the different species. These races I designate at present by the letters of the alphabet, A, B, C. The diagnostic characters seem to be quite distinct. Race A can be called the 8-rowed type; race B the 12-rowed type; race C the many-rowed type, although the number of rows need not, in any one variety be of constant count. In season relations race A is early, race B medium, race C late, and yet the relation is but a general one. Race A has rounded kernels, race B kernels with straight sides and shallow, race C kernels with straight sides and deep, yet these relations are not absolute in themselves. Race A has small to medium ear-stalks, race B medium to large ear-stalks, race C medium to small ear-stalks, and yet the relations not always constant. Race A has kernels which never round over the butt; race B kernels which scarcely, if ever, round over butt of ear; race C kernels which round strongly over the butt of the ear. Race A ears which are of cylindrical type; race B ears which tend to taper; race C which tend to taper strongly. The union of these characters seems available to separate the races with distinctness when the ears are examined in numbers, although when single ears are examined some of the characters given may be absent or divergent.

These races do not seem to cross with each other through current hybridization. A and B seem usually to be resistant, if not always, while C never crosses with A or B, so far as I have observed. Using now these conclusions, we will attempt to class our sweet corns through the character of the current hybridization, placing in race C those which receive race C dent kernels, and in race A those

which receive the race A Black Mexican kernels, and in race B those which receive flint kernels, but which have not received the Black Mexican kernels.

Received current hybridization from Black Mexican.	Did not receive kernels of Black Mexican.	Received dent kernels.
*Asylum.	Amber Cream.	Clark's Old Colony.
Black Mexican.	Genesee Early.	Egyptian.
*Brighton Orange.	*Golden.	Landreth.
*Crosby's Early.	Hickox.	Ne Plus Ultra.
Dolly Dutton.	Mammoth.	*Squantum.
Dwarf Early.	Moore's Early.	Stowell's Evergreen.
Eight-rowed Early.	Orange Early.	
Ford's Early.	Orange Sweet.	
Marblehead Early.	*Potter's Excelsior (Sibley).	
Minnesota Early.	*Rochester.	
Narragansett Early.		
Pratt's Early.		
Tom Thumb.		
Triumph.		

* See description and discussion of these varieties below.

In my classification of sweet corn, already referred to, I had arranged my varieties substantially as in the above table but with the following exceptions:

Asylum in Race B.
 Brighton Orange in Race B.
 Crosby's Early in Race B.
 Golden Sweet in Race A.
 Potter's Excelsior in Race C.
 Rochester in Race A.
 Squantum in Race B.

It will be well to investigate these discrepancies, and in so doing, we note:

ASYLUM.—Belongs by description to race B, and we can suggest that this was carried to race A in our hybridization classification by receiving pollen from a stray plant of class B, *Black Mexican*, whereby we were deceived. This is a probable explanation.

BRIGHTON ORANGE.—This is a synonym of Orange Early and Orange. It is said to be a hybrid between the *Narragansett*, race A, and *Moore's Early*, race B, and hence is liable to throw both forms of ears. As grown in 1884, *Brighton Orange* (Gregory), and *Orange Early* (Sibley) belong by description to race A, while *Orange Sweet* (Parker & Gannett) belongs to race B, and answers the description of fig. 350, *Rural New Yorker*, 1884. It is probable that we have, in this variety, two forms, which are distinct, and yet which are grown together, and that our classification is correct in both instances for the varieties studied.

CROSBY'S EARLY.—This corn appears to have two types, but the

large majority of ears belong to race B, to which it was assigned in the *Rural New Yorker* description. Some few ears, however, were of race A. It is possible that the race B varieties of the *Black Mexican* furnished the pollen which produced the black ears as in No. 1838, we had unwittingly this type. In 1883 Crosby's Early did not receive the *Black Mexican* kernels, and hence would have been placed in race B, where it belongs by description.

GOLDEN SWEET. — In the *Rural New Yorker* classification, I say, "this variety is about equally eight-rowed and ten-rowed and varies in sample ears from section A towards section B. It is probable that selection would readily produce an eight-rowed and twelve-rowed sort." Neither in 1883, nor in 1884, did this variety receive *Black Mexican* kernels. With my present knowledge I must call this variety an anomalous type, and must await further study.

POTTER'S EXCELSIOR. — This is a variety which varies considerably. In 1883 it did not receive the *Black Mexican* kernels, as was likewise the case with the sample in 1884, but did receive a few soft kernels in one sample of 1884. It probably belongs to race C, as grown by its originator, and as described in *Rural New Yorker*, while the Station samples as unquestionably belong to race B, both by description and by the test of hybridization.

ROCHESTER. — This is the same as Eight-rowed Early, as is not alone recognized by its appearance, but also as acknowledged by its distributor. It is negative evidence only that puts it in race B, and it undoubtedly belongs to race A.

SQUANTUM — Unquestionably of Race C type, both by description and the hybridization test, in samples grown in 1883 and 1884, and was placed in race B, in the *Rural New Yorker* classification by error.

AMBER CREAM. — In 1883 some black, sweet kernels noted, which would place it in race A. It is said to be a cross between *Moore's Early* and *Briggs' Early* corns of race A and race B type. We can only account for the discrepancy by the presence of *Black Mexican*, race B, pollen, for the description of both years would place it in race B.

In the *Golden Sweet* we have a yellow, sweet kernel. This yellow kernel appeared on the *Hickox*, *Marblehead*, *Moore's Early* and *Stowell's* only of the sweets, all of the same race.

PROPOSITION. — *Current cross-fertilization is facile between varieties of the same race.*

If we examine the records of our trials we will find that wherever we have a test or witness variety present, there seems to be fa-

cile current hybridization between varieties of a race, at least in most instances. The red color, however, is very resistant, and seldom shows change. This conclusion is too evident to require tabulation.

PROPOSITION 6. *Where cross-fertilization has taken place in maize, the tendency is to produce both parental types, and not toward intermediates.*

A slight examination of our records shows as well what experience confirms, that cross-fertilization is quite general between varieties of a race, and that if selection does not interfere, two distinct varieties can be continued for an unknown period within the same nomenclature unless they are such that climate can differentiate an exclusion of the one in favor of another. Thus the flint corn, which may be described as Early Canada and Canada, quite distinct forms, can be grown together, and are grown together, without being noticed. The same is true of the Canada and the Dutton, as also of many other kinds. We have already incidentally called attention to this duplication within a variety in the case of some sweet corns. Further illustration in flints is seen in Nos. 1847, 1868, 1871 and 1872; in dents in Nos. 1874, 1879, 1882, 1884, 1885 and 1887; in soft corns in Nos. 1889, 1893, etc.

PROPOSITION 7. *Color can pass, through current hybridization, very freely from one agricultural species to another.*

The proof of this proposition is at once obtained by the reading of the descriptions of the current hybridization of the two years records.

PROPOSITION 8. *Red color is the strongest of the colors in resisting the action of current hybridization, yet it is by no means insensible to the action of proper pollen.*

For support of this proposition see especially Nos. 1841, 1866, 1902, 1926 and others.

PROPOSITION 9. *Kernels can be partially fertilized by several kinds of pollen.*

Reference to Nos. 1814, 1817 and 1902. It is probable also that the many purple striped kernels are also in evidence.

PROPOSITION 10. *Sports in a crop from hybridized seed are not common.*

The proof of this proposition is the readiness in which, in most cases, the various kinds of corn grown from Station-grown seed can be referred to varieties with which crossing could have taken place, and the closeness with which the ears came to described types.

Some of the exceptions were in the cases of seed of whose past history we were unacquainted, and in which presumption of hybridization was quite strong.

One of the greatest obstacles that exist at present to the improvement of our farm vegetables is the entire lack of a nomenclature whereby the distributor shall know what he distributes, and that the receiver shall know that he has received what he has desired. There are many varieties of corn sold under the same name, as in one collection from nine different sources of one of the most easily identified of our varieties, the King Philip, five or seven distinct sorts were obtained. In wheat, oats, barley, etc., the same condition of things seem to exist, and this receives forcible illustration in the great quarto work on the wheats of France, by those eminent seedsmen and botanists Vilmorin et Cie., in which no description of varieties is attempted beyond the figures which are given. Before then much progress can be expected in our efforts to study into the adaptation of varieties through the gaining of knowledge concerning the effects of climate, culture, crossing and selection, we must have a nomenclature whereby different observers can report their observation, not upon names of varieties only, but upon varieties themselves, such as can obtain sure recognition as being of the same sort.

Had agricultural science received the same aid from museum collections as has natural science, such a condition of affairs would have ceased to exist, as the study of collections would have given recognition to descriptive features, which would have found service in establishing a nomenclature for the benefit of the public. To do this now, without the assistance of accumulated specimens from different regions, and from all possible sources, is a work of magnitude, as types are not recognized as yet by the collector, and variabilities are more apt to be sought than the typical productions of a crop.

In any crop, as at present grown, divergencies are numerous, and this fact is so well known, that it is useless to occupy our space with illustrations, but one will suffice. Sinclair mentions a collection of sixty varieties of Ray grass in England in 1823. What constitutes a divergence is left to the fancy of the reporter. If, however, these divergencies were subjected to systematic study and comparison, it would be found, we opine, that many had no meaning whatsoever, while others had a true significance; that one set were accidental, so to speak, the other diagnostic.

In the case of maize we have given much study, not only to sample ears collected by hundreds from over a wide area, but to over two hundred growing varieties or samples of different origin, and we have studied carefully whole crops grown from single varieties, so called, of seed, and, we think, we have recognized two sets of variations.

The first accidental, that is, those which have little meaning as

those of size, imperfect filling of the grains, suppression of parts, etc. The second diagnostic, as not only resisting change of climate and culture, but which also resist change produced by hybridization. Great variability in appearance coming from the first of our causes have little true significance, and can be ignored in classification, as being of general occurrence in all types. A very slight variability in the second set may have the utmost meaning as indicating a separation of types. Color, although so prominent, cannot be considered typical, but rather of variety significance only.

The diagnostic points about maize are the size of the ear stalk, medium small, large, and small: the shape of the ear, whether cylindrical or tapering, or swollen at but: the position of the kernel, rounding over the cob at but, or not rounding: the character of the ear towards tip, whether pointed or otherwise; the shape of the kernel.

The variety characteristics are the color; size of ear, of cob, of kernel; the filling at tips, the openness between pairs of rows; date of growth; usual number of rows.

The accidental points are the number of rows within certain limits, irregularity of row, suppression of rows and kernels, changes in kernel through current hybridization, changes of ear through previous hybridization, changes which occur from harvesting before maturity, or from unfavorable season.

Whether we consider the sweets, flints, dents, softs or pop corns we find a parallelism occurring throughout in the diagnostic points: *i. e.*, the same or quite similar types appearing in all, and as we have before stated, resistance to cross-fertilization between the types, in whatever contrasts they be grouped. With our present knowledge, this unwillingness to cross, is but a resistance, not a refusal, for it is probable that when the cross is forced through withholding of the type pollen, and furnishing the pollen of another type that seed will be often produced which shall yield in its planting the effects of the cross, and also that, as we have heretofore stated, the ovules on hybrid plants have less resistance to cross-fertilization with other types than have ovules on plants of strict variety characteristics.

We propose to offer a classification of maize, and a description of varieties, so far as we have had material in our collections.

The first class we shall take is the sweet corns, which we call an agricultural species, indicating the agricultural relationship by a * placed between the generic and specific name.

ZEA * SACCHARATA, THE SWEET CORNS.

An agricultural species of *Zea mays* L., characterized by the cartilaginous translucency of its kernels which when ripe and dry are crinkled and crimped, wrinkled, or wrinkled and shrivelled; by the absence of visible starch in a cross section of the kernel; and by the tenderness and sweetness of the kernels in a green state: while unripe usually white and plump kernelled: when ripe, of a peculiar amber color, but in varieties flesh colored to red, slate colored to nearly or

quite black, or yellow. Plant various; ear various; maturity various as in other agricultural species.

RACE A. Ear stalk medium small, ear cylindrical, kernels not rounded over butt of ear, ear usually pointed towards tip, kernel more or less rounded, broader than deep, usually 8-rowed. Color various. Plant small to medium; season early to medium late.

† Red cob and whitish kernels.

1. PRATT'S EARLY. Ears about 5 inches long, about one and one quarter in diameter, usually tapering somewhat through irregularly added kernels toward butt; almost entirely 8-rowed, but occasionally 10-rowed ears. Kernels crinkled, strongly rounded. Plant about four and one-half feet tall, bearing its ears about 9 inches from the ground.

Introduced by Gregory and in his catalogue of 1881.

†† Red cob and reddish kernels.

2. MARBLEHEAD. Synonyms — *Early Marblehead*; *Extra Early Marblehead*. Ears six to six and one-half inches long, usually larger toward butt; about one and three-eighths inches in diameter; almost always 8-rowed in the larger part of the length, yet often 10-rowed toward butt; kernels broadly rounded, crinkled to crimped, red-tinged to reddish flesh colored. Plant about four and one-half feet tall, bearing ears eight to nine inches from the ground. Suckers considerably. The kernels, when fit for use, often tinged with purple.

Introduced about 1878, and gained by selection from the Narragansett. Distributed from, but not originated in, Marblehead, Mass.

3. NARRAGANSETT. Synonym — *Early Narragansett*. Ears six to seven inches long, and about one and three-eighths inches in diameter, strictly cylindrical, but tapering strongly in the tip fourth, and a strong tendency to openness between the pairs of rows; 8-rowed in general; kernels rather flatly rounded, closely set, crimped, the color varying from a light flesh tinge to a quite dark red, as distributed by seedsmen. Plant about five feet tall, bearing its ears about eight to fourteen inches from the ground, according as the seed is light or dark colored. When a little too old, the boiling corn shows its color.

This variety was exhibited in 1878, perhaps introduced some years earlier, or between 1863 and 1866, as Burr describes a Narragansett without stating the color of the kernels, but which corresponds with this in other respects.

4. RED RIVER. Ears about four inches long, by one and one-quarter to one and one-half inches in diameter, strictly cylindrical, bluntly rounded at apex; 8-rowed in general; kernel large, flatly rounded, rather deep, crinkled, closely set, of a reddish flesh color. Advertised by the North Star Seed Farms as "the earliest good sweet corn known."

A sub-variety of the Narragansett, which originated in Minnesota, and was known as early as 1878.

††† White cob and whitish kernels.

5. MINNESOTA. Synonyms — *Early Minnesota*; *Ford's Early*, Gregory. Ears, five to six inches long, and about one and one-half inches in diameter, rather blunt at tip; 8-rowed; kernels large, a little pointed rounded, crinkled and scarcely crimped, closely set. Plant about four and one-half feet high, and bearing its ears about ten inches from the ground.

Introduced about 1874, and exhibited as new in 1878. It is thought to have been obtained through selection from the Narragansett.

6. TOM THUMB. Ears five to six inches long, and one and one-half inches in diameter, a little pointed toward tip; eight and 10-rowed, not usually filling well at tip; kernels large, broadly rounded, a tendency to openness between pairs of rows, crinkled and crimped. Plant four to five feet tall, and bearing its ears about fifteen inches from the ground; of scant foliage.

Introduced prior to or about 1865.

7. DOLLY DUTTON. Ears four to six inches long, and about one and three-eighth inches in diameter, often tapering through spaces occurring between the rows, blunt at tip; 8-rowed; kernels broadly rounded, large, crinkled; cob small, and often red stained in the center; plant about four and a half to five and a half feet tall, and bearing its ears eight to ten inches from the ground.

Introduced in 1878.

8. WYOMING. Ears seven to eight inches long, and about one and five-eighth inches in diameter, usually slightly tapering through openness between the pairs of rows, rather pointed toward the tip, which is rarely well filled; eight to 10-rowed; kernels large, quite flatly rounded, crinkled to crimped; plant about five and a half feet tall, and bearing its ears low.

Introduced prior to 1883; very near to the Eight-rowed Early, but somewhat earlier.

9. DARLING'S EARLY. Ears six to eight inches long, and about one and three-eighth inches in diameter; 8-rowed, quite blunt at tip; kernels shallow, not large, broadly rounded, crinkled and crimped, with a tendency toward openness between the rows; plant about five and a half feet tall, of slender habit, and bear its ears medium low on the stalk.

It was exhibited as early as 1851.

10. DWARF EARLY. Synonym — *Extra Early Dwarf*. Ears five to six inches long, and about one and one-quarter inches in diameter, nearly cylindrical, but tapering in the lower third or half, often curved; 8-rowed; kernels a little pointed, but broadly rounded otherwise, nearly large, crinkled and crimped; plant four to five feet tall, and bearing its ears about twelve inches from the ground.

Probably gained through selection from the Eight-rowed Early, and seems to be the Small Early Sweet of Salisbury, 1848,

11. EIGHT-ROWED EARLY. Synonyms — *Early Sweet*, Ferry; *Rochester*, Sibley. Ears seven to nine and one-half inches long, one and one-quarter to one and five-eighths inches in diameter, strongly tapering

from the lower half, quite variable in size, 8-rowed. Kernels large, often separated by openness between the pairs of rows, broadly rounded, crinkled. Plant six to seven feet high or more, and bearing its ears from twelve to thirty inches from the ground.

Very likely the Sweet or Sugar of Bridgeman, 1832, and the Eight-rowed Sugar of Schenck, 1854. The plant is quite variable in height leafiness and maturity. In 1884, at edible maturity August 20, and yet at harvest October 16, some ears were ripe, others just past edible condition, and yet others not at the edible stage.

12 TRIUMPH. Synonym — *New Triumph*, Ferry. Ears about eight to nine inches long, and about one and one-half inches in diameter, slender, tapering evenly and strongly in lower half; about equally eight and 10-rowed, the tip not well filled. Kernels large broadly rounded, almost flat, very frequently openness between the pairs of rows, crinkled and crimped. Plant about six to seven feet tall, and bearing its ears about thirty inches from the ground.

Introduced in 1874, "the result of ten years' careful cultivation and selection." The variety is as yet scarcely fixed.

† † † † White cob and yellow kernels.

13. GOLDEN. We have in this variety an instance in all probability of the color being so characteristic as to admit of two different forms being grown and perpetuated under the same name, and in the same crop. The variety which belongs to this section may be called **GOLDEN EIGHT-ROWED**, and bears out the following description: Ears about five inches long and one and one-quarter inches in diameter; strictly cylindrical and 8-rowed, not filling well at tip. Kernel not deep, medium, crinkled, of a golden yellow color. Plant about five and one-half feet tall, bearing its ears low.

Probably referred to by Salisbury, 1848, who says "there is another variety of sweet corn made by crossing the Sweet and the Early Canada corn." This idea of its origin is recognized by Burr, 1863, who says "apparently a hybrid between Common Yellow or Canada Flint and Darling's Early." There is no evidence of this hybridity, however. See **GOLDEN**, No. 24.

† † † † † White cob and black kernels.

14. BLACK MEXICAN. Synonyms — *Black Sugar*; *Slate Sweet*, Burr. We have here another instance of two types being grown together under one name. The second form we will describe under the name **Black Sugar**, in another section. Ears six to eight inches long, and about one and one-half inches in diameter, cylindrical even to tip which is rarely well filled. Kernels broader than deep, rounded, crinkled, compactly set, of a slate black color. Plant about five to six feet tall, bearing its ears six to eight inches from the ground.

This is the variety described by Burr in 1866, under the name of **Black Sweet**.

RACE B. Ear stalk large, ear tapering slightly, kernels rounded, as deep or slightly deeper than broad; usually 12-rowed. Color various. Plant medium to large. Season medium to late.

† Red cob and whitish kernel.

15. RED COB. Ears six and one-half to seven and one-half inches long, and one and five-eighths to one and three-quarter inches in diameter, rounded at tip; 12-rowed. Kernels nearly flat on top, crimped.

Described from ears received from Bliss & Sons.

†† Red cob and reddish kernel.

16. ORANGE. Synonyms — *Early Orange*; *Brighton Orange*. Ears six to seven inches long, and about one and three-quarter inches in diameter, well rounded at tip; twelve to 14-rowed. Kernels flatly rounded, as broad as deep, crinkled and crimped, light flesh red with a scarcely perceptible orange tint. Plant about six feet high, bearing its ears about thirty inches from the ground.

Introduced about 1883, and said to be a hybrid between the Narragansett and Moore's Early, and improved by selection for five years. It is yet scarcely fixed.

††† White cob and whitish kernel.

17. GENESEE. Synonym — *Early Genessee*. Ears six to seven inches long, and about one and one-half inches in diameter, a little pointed at tip; 12-rowed. Kernels flatly rounded, crimped, compressed at but. Plant five to six feet tall, bearing ears about ten inches from the ground.

Introduced in 1883 and said to be a cross between Minnesota Early and Amber Cream. Scarcely yet fixed as it bears some 8-rowed ears resembling Minnesota Early.

18. CROSBY'S EARLY. Synonyms — *Extra Early Crosby*; *Crosby's Early Twelve-rowed*. Ears six to seven inches long, and about one and one-half to one and five-eighths inches in diameter, a little pointed towards tip; 12-rowed. Kernels flatly rounded, crimped. Plant about five and one-half to six feet tall, bearing its ears about sixteen inches from the ground.

Introduced about 1860.

19. MOORE'S EARLY. Synonyms — *Moore's Early Concord*; *Moore's Concord*; *Early Concord*. Ears six to eight inches long, and about one seven-eighths to two inches in diameter, rather pointed toward tip; 12-rowed; kernels not closely set upon the dry ear, very flatly rounded, crimped; plant six to seven and a half feet high, and bearing its ears about twelve inches from the ground.

Originated by J. B. Moore, Concord, Mass., its claimed parentage being Crosby's Early and Burr's Improved. It was first crossed in 1865, and again in 1867, and in 1869 exhibited, but its character was not then permanently fixed. The depth and looseness of kernel suggests the cross that is claimed for it.

20. AMBER CREAM. Ears seven to eight inches long, and one and one-half to one and one five-eighths inches in diameter, rather pointed at the tip, and inclined to be compressed at the but; 12-rowed; kernels very flatly rounded, closely in contact, not large, crinkled; plant about six to seven feet tall; the ears borne about eighteen inches from the ground.

Said to be a cross between Moore's Early and Brigg's Early, the latter a discarded variety with often pink-tinged kernels, and 8-rowed. Its color is scarcely as yet fixed, as some ears have a red tinge.

21. **ASYLUM.** Ears seven to eight inches long, and about two inches in diameter, often tapering rather strongly at lower third; 12-rowed, with a tendency to a slight opening between the pairs of rows; kernels scarcely rounded, crinkled and crimped; plant about six to seven feet tall, bearing its ears about thirty to thirty-five inches from the ground.

An eight to 10-rowed variety was introduced between 1863 and 1866, under the name of Rhode Island Asylum (Burr), and a Rhode Island Sweet is described by Salisbury in 1848 as 8-rowed.

22. **HICKOX.** Synonym — *Hickox Improved*. Ears eight to ten inches long, and about one and three-quarters to one and seven-eighths inches in diameter; 12-rowed, kernels slightly rounded, large, crimped; plant about six to seven feet tall, and bearing its ears about thirty inches from the ground.

Introduced about 1883.

23. **MAMMOTH.** Synonym — *Marblehead Mammoth*. Ears eight to ten inches long, regularly tapering to a rounded, unfilled tip; twelve to 16-rowed; kernel not large, rather flat rounded, crimped, close between rows, loose between kernels; plant six to seven feet tall, and bearing its ears from twenty-four to thirty-six inches above the ground.

Marblehead Mammoth Gregory seems to be an earlier form, bearing its ears twenty-four inches above the ground, and a tendency to more rows. I can see, however, no difference otherwise.

Introduced before 1881, and said to have originated from a large ear accidentally observed in a seed store.

++++ White cob and yellow kernel.

24. **GOLDEN.** Ears about seven inches long, and one and a half inches in diameter, inclined to taper at upper portion quite strongly, rarely filling at tip; ten to 12-rowed; kernel medium large, rather flatly rounded, crimped, with a tendency to openness between the pairs of rows; golden amber color even while unripe; plant five and a half to six and a half feet tall, and bearing its ears about twenty inches from the ground.

This variety has two forms, one of which is described as Golden Eight-rowed, No. 13.

++++ White cob and black kernel.

25. **BLACK SUGAR.** Ears about six to seven inches long, scarcely ever filled at tip; ten and 12-rowed; kernels nearly flat on top, or flat on top with rounded edges, large, crinkled and crimped; plant six to seven feet tall.

The Black Sugar, No. 25, and the Black Mexican, No. 14, have no distinction in the catalogues of seedsmen, and are usually grown together, the seeds from the same source yielding both varieties, which can be readily separated.

RAOE C. Ear-stalk small, ear tapering, often strongly, kernels flattened, sometimes rounded, deeper than broad, usually 16-rowed;

ever in contact, rounding over cob at libe condition; plant rather large; sea-

ob and whitish kernel.

to seven inches long, about two inches agly tapering to a seldom well-filled tip; s large, crimped, not closely in contact; feet tall, bearing its ears about twenty-

l.
nd perhaps gained by selection from *Pot-
's Island Asylum*.

Synonyms — *Excelsior*; *Early Excel-*
nches long, and one and three-quarters
apering, blunt at tip; 12-rowed. Kernel
wrinkled, closely in contact. Plant five
lf feet tall, bearing its ears about thirty

and quite variable even now in the size
y of the rows, which in crops from Mr.
regular to be counted. As grown by
a plumper and more regularly rowed
ed and more compactly set. Mr. S. M.
Early Minnesota and "*Old Asylum*."
a careful selection, saving for seed both
to hold to the type, in which the kernels
Mr. Potter's strain the ear is often oval
ess of the kernels yielding to the press-

. Ears seven to eight inches long, and
s inches in diameter, strongly tapering
utt in upper third, fourteen to 16-rowed.
small, crimped and somewhat wrinkled,
Plant about six feet tall, bearing its ears
e ground.

1884, and not yet fixed, throwing very
ten and 12-rowed. The description is
inator, and supplemented by the data ob-
e station garden. It is entirely distinct,
lony of Burr, 1863.

— *Washington Market*. Ears six to
one and seven-eighths inches in diameter,
trongly toward butt in the upper fifth;
s large, crimped and wrinkled, shrunken
Plant about six feet tall, and bearing its
s from the ground.

1 — *Landreth's Sugar*. Ears six and
and about one and three-quarters inches

in diameter, 16-rowed, rather pointed at tip. Kernels crimped and wrinkled, not large. Plant about six feet tall.

Introduced in 1884.

31. BURR'S IMPROVED. Ears eight to ten inches long, and about two to two and one-eighth inches in diameter, rounded at tip, evenly and strongly rounded in the upper portion to the ear stalk; 16-rowed. Kernels crinkled and wrinkled, large, very loose. Plant about seven feet tall, and bearing its ears about thirty to thirty-six inches from the ground.

A variety of this name was mentioned in the United States Patent Office Report for 1855, and it is named as receiving premiums in 1860. Burr says in 1863 "an improved form of the 12-rowed sweet."

32. STOWELL'S EVERGREEN. Synonym — *Evergreen*. Ears seven to eight inches long, and about two and one-fourth inches in diameter, often sharply tapering, and then again nearly cylindrical, rarely filling at tip, 16-rowed. Kernels very narrow and deep, very loose, shedding readily from the dry ear, wrinkled. Plant about seven and one-half to eight feet tall, bearing its ears about thirty inches from the ground; foliage abundant. Remarkable for the long time its ears remain in edible condition.

Introduced in 1884.

33. NE PLUS ULTRA. Ears six to seven inches long, and about one and three-fourths inches in diameter towards butt, where it is strongly rounding, and from near which it strongly tapers to a point at the tip; very irregular-rowed, often twelve to 14-rowed, or more. Kernel very narrow at base, crimped and wrinkled, very thin and translucent, separating readily from the cob. Plant about five to six feet tall, bearing its ears eighteen or twenty inches from the ground; foliage scanty.

Introduced about 1882.

The Sweet Corns form a group that is extremely well defined, and offering no transition stages with any other group.

The maturing of the varieties :

Race A.	1882.		1883.		1884.	
	First bloom.	Boiling ears.	First bloom.	First bloom.	Boiling ears.	
1. Pratt's Early.....	.....	.....	July 16	July 10	Aug. 2
2. Marblehead.....	July 29	Aug. 11	" 12	" 11	July 27	
3. Narragansett.....	" 29	" 8	" 16	" 19	Aug. 8	
4. Red River.....	.....	.....	.....	.....	.....
5. Minnesota.....	July 29	Aug. 11	July 16	July 17	Aug. 6	
6. Tom Thumb.....	" 29	.....	" 16	" 18	" 7
7. Dolly Dutton.....	.....	.....	" 16	" 18	" 8
8. Wyoming.....	.....	.....	" 23	.....	.....
9. Darling's Early.....	Aug. 3	Aug. 24	" 23	.....	.....
10. Dwarf Early.. ..	.....	.....	" 23	July 31	Aug. 20
11. Eight-rowed Early.....	Aug. 3	Aug. 24	" 30	" 31	" 20	
12. Triumph.....	July 31	" 21	Aug. 2	" 30	" 22	
13. Golden.....	.....	.....	.....	.....	.....
14. Black Mexican.....	.....	.....	July 31	July 21	Aug. 20

Race B.	1882.		1883.	1884.	
	First bloom.	Boiling ears.	First bloom.	First bloom.	Boiling ears.
15. Red Cob.....	.....	.....	.....	.....	.....
16. Orange.....	.....	.....	.....	July 20	Aug. 8
17. Genesee.....	.....	.....	.....	" 20	" 13
18. Crosby's Early.....	July 29	Aug. 11	July 31	" 25	" 13
19. Moore's Early.....	Aug. 8	Aug. 24	" 28	" 25	" 17
20. Amber Cream.....	.....	.....	" 28	" 25	" 14
21. Asylum.....	.....	.....	" 30	" 31	" 20
22. Hickox.....	.....	.....	" 31	" 29	" 23
23. Mammoth.....	Aug. 6	Aug. 31	Aug. 6	Aug. 1	" 24
24. Golden.....	.....	.....	July 28	July 20	" 11
25. Black Sugar.....	Aug. 5	Aug. 31	.....	.....	.....
Race C.					
26. Squantum.....	.....	.....	July 27	July 28	Aug. 20
27. Potter's Excelsior.....	.....	.....	" 26	Aug. 3	" 23
28. Clark's Old Colony.....	.....	.....	.....	July 20	" 13
29. Egyptian.....	Aug. 14	Sept. 11	Aug. 6	" 28	" 20
30. Landreth.....	.....	.....	.....	" 26	" 17
31. Burr's Improved.....	.....	.....	.....	" 28	" 22
32. Stowell's Evergreen.....	Aug. 8	Aug. 24	Aug. 2	Aug. 8	" 25
33. Ne Plus Ultra.....	.....	Sept. 27	" 7	July 28	" 19

ZEAL * INDURATA, THE FLINT CORNS.

In this agricultural species also, we have three races, which we shall designate as A, B, and C. These are all characterized by the structure of the kernel, which in section shows the corneous matter extending completely about the visible starch, and which is unlike the structure found in the kernels of the other races, except in the case of certain pop corns, from which it is distinguished by size of ear and kernel. In some extreme cases this corneous matter becomes extremely thin at the summit, and allows the shrinkage of the interior in drying to break in or indent, and thus except as taken in connection with other characters, the kernel would occasionally answer to the description of a dent. Color, various but glossy.

RACE A.—Ear stalk small to medium; ear cylindrical in whole or in larger part of its length. Kernels not rounded over butt, rounded, broader than deep, usually 8-rowed; color various.

† Ear strictly cylindrical, or tapering only slightly at lower third; cob white.

* Colored kernels.

1. BLUE FLINT.—Ears six to eight inches long, about one and one-fourth inches in diameter; resembles the Canada in every respect, save color, which is yellow red striped, with blue kernels intermixed.

This seems a very ancient corn, now almost out of cultivation. In 1848, Salisbury mentions it as then not much cultivated, and in 1850, a correspondent from Bloomfield, Me., to the United States Patent Office Commissioner, says: "The old Indian corn remains nearest to its pristine state, tall and straight, two ears to the stock, half bluish and half yellow." Josselyn in his "Rarities," 1638-63, says "Indian wheat, of which there are three sorts, yellow, red and blew.

The blew is commonly ripe before the others a month." In 1629, Rev. Higginson says of the corn of Massachusetts, "varieties of colors, as red, blew and yellow," and in 1620, when the explorers of the Pilgrims unearthed a deposit of Indian grain they found "some six and thirty goodly ears of corn, some yellow, and some red, and others mixt with blue."

2. CANADA. Synonym — *Early Canada*, Vaughan, Ferry, Henderson. Ears six to eight inches long, and about one and one-quarter inches in diameter, bluntly rounded at tip; mostly 8-rowed; kernels rather large, of a deep golden orange color; cob small; plant five and one-half to six and one-half feet tall, and bearing its ears from eighteen to twenty inches above the ground. A northern form, to which many local varieties can be referred.

3. CHADWICK, Vaughan. Answers to the Canada in all respects, except color, which is a duller orange yellow.

4. LARGE YELLOW CANADA, Henderson. Synonyms — *Pierce's Columbia*, Breck; *Pierce's Improved Canada*, Vaughan. Differs from the Canada only in its slightly larger kernel, and in the greater frequency of the taper in the lower third of ear.

5. WAUSHAKUM. Ears eight and one-half to nine inches long, and about one and one-half inches in diameter, filling completely and roundly at tip. Kernel rather large, rather flatly rounded, very close set, of a deep golden orange color; mostly 8-rowed; cob small. Plant seven to nine feet tall, leafy, and bears its ears about twenty inches from the ground; crop very uniformly on type.

Originated with Sturtevant Bros., Waushakum farm, Framingham, Mass. The originals two quite stable varieties of a mixed Canada and New England 8-rowed type, which were allowed to hybridize in 1875, and the ears resulting selected to the desired type. In 1877 and 1878, at the period of bloom, all the tassels from stalks not showing one large ear, and from all imperfect or off-type plants were removed, thus insuring the fertilization of the ears from prolific and typical plants.

6. ORANGE FLINT, Thorburn. Ears eight to nine and one-half inches long, and about one and seven-eighths inches in diameter, usually tapering slightly in lower third, and filling bluntly and well at tip; mostly 8-rowed; kernels larger than Waushakum, which variety it closely resembles; color golden orange; plant about seven and one-half feet tall, and bears its ears about twenty-four inches from the ground.

7. GOLDEN DEW DROP, Thorburn, Henderson. Ears nine to ten inches long, and one and one-half to one and five-eighths inches in diameter, tapering at lower third very distinctly, filling well at tip; mostly 8-rowed; kernels large, well rounded, rich golden orange; cob medium small; plant about seven feet tall, bearing its ears about twenty inches from the ground; resembles Waushakum quite closely, but the larger cob, and slightly larger average ear and kernel distinguish it.

8. **LONGFELLOW**, Gregory, Ferry, Sibley, C. O. Ellms. Synonym — *Ellm's Early Yellow Field*, Parker & Gannett. Ears nine to ten and one-half inches long, with a tendency towards expansion at butt, and a decided taper at the lower third, and a rather pointed, but filled tip; mostly 6-rowed. Kernel rather large, well rounded, deep-yellow orange. Plant about seven feet tall, bearing its ears about twenty inches from the ground. Crop rarely uniform; other types of ears appearing in the crop usually of the New England Eight-rowed type.

9. **EIGHT-ROWED YELLOW**, Thornburn. Synonym — *Long Yellow Ferry*. Ears ten to eleven inches long, and about one and a half inches in diameter; slender, slightly tapering in lower third; mostly 8-rowed. Kernel not large, deep golden orange. Resembles Wau-shakum somewhat, but the kernels less deep, and a tendency to inserted kernels; at butt quite strong. Not well bred.

10. **FLESH-COLORED**, Thorburn. Ears nine to ten inches long, about one and a half inches in diameter. Subject to openness between pairs of rows toward butt, and tapering also in lower third, towards the not well filled tip; mostly 8-rowed. Kernel rather large, of a brownish-yellow. Cob, medium to large. Plant about seven feet tall, and bearing its ears about thirty inches from the ground.

11. **KING PHILIP**, Vaughan. Synonyms — *Improved King Philip*, Sibley; *Eight-rowed Brown*, Gold; *Eight-rowed Copper-colored* of various regions. (Described ears from twelve different sources, including Henderson, Vaughan, Sibley, Professor Beale and Secretary Gold.) Ears eight to ten inches long, and about one and a half inches in diameter, resembling Canada in all other respects except color, which is a characteristic copper red. As originally sent out, 1852, the plant was short; it is now from five and one-half to eight feet tall, and bears its ears eighteen to twenty inches from the ground.

Originated by John Brown, Long Island, Lake Winnipigseogee, N. H., and extensively distributed from the United States patent office in 1852 and afterward. It is probably an old Indian form as it occasionally appears as a sport in the crop from the purest obtainable seed of Canada.

12. **EIGHT-ROWED BROWN**. Resembles the Canada in every respect but color, which is a dark purple brown. It furnishes the red ear connected with husking customs, both by the Indians and by Americans in the regions where the Canada corn is grown. It is occasionally grown by itself by a few folks, from fancy, and soon comes to be remarkably true in type and color.

** Kernels, white; some tinged.

13. **EIGHT-ROWED RED-GLAZED**, Sibley. Ears ten to eleven inches long, and about one and a half inches in diameter, a decided taper toward lower third; mostly 8-rowed. Resembles Lackawaxen in all but color, which is white in the upper portion of the ear, and white more or less purple tinged in the lower portion. Kernels rather large. Cob, small. Plant about six to seven feet tall.

*** Kernels white.

14. FORTY DAYS, Gregory. Ears about six inches long, and one and a quarter to one and three-eighths inches in diameter, often tapering throughout through openness or added kernels toward butt; mostly 8-rowed. Cob, not small. Plant about four and one-half feet tall, and bearing its ears about ten inches from the ground. In 1884, planted May 19, vegetated May 26, and edible maturity August 2, and ripe August 26.

15. RHODE ISLAND WHITE CAP. Ears five to five and one-half inches long, and about one and a half inches in diameter, strongly rounded and prominently capped at tip; mostly 8-rowed. Cob, small, often red-tinged in the interior. Kernels very large and hard. Plant about seven feet high, and bearing its ears about eighteen inches from the ground.

16. CONNECTICUT WHITE. Ears six to seven and one-half inches long, and one and five-eighths inches in diameter; the tip compactly filled and rounded; mostly 8-rowed. Cob, medium small. Kernels very large. Plant five and one-sixth to six feet tall. A very distinct variety, and a larger form of the preceding.

17. SILVER WHITE, Vaughan. Synonyms — *Eight-rowed White*, Thorburn; *White Australian*, Professor Beal. Ear nine to eleven inches long, and about one and a half inches in diameter; tip seldom well filled, and a tendency toward openness between the pairs of rows at butt; mostly 8-rowed. Kernels silvery white. Plant about six to seven feet tall, bearing its ears about twenty-four to thirty inches from the ground.

18. LAOKAWAXEN, Ferry. Synonym — *White Flint* of many farmers. Ears ten to eleven inches long, and one and three-eighths to one and a half inches in diameter, with a tendency toward openness without loss of cylindrical shape between the pairs of rows towards butt; mostly 8-rowed. Cob, small. Kernel, dingy white. Plant said by Ferry to be about eight feet tall. The same in all but coloring as *Eight-rowed Red-glaced*.

19. SANFORD, Gregory, Sibley. Ears eight to ten inches long and about one and three-fourths inches in diameter, usually tapering through spreading caused by openness between pairs of rows at butt, rounded and well filled at tip; mostly 8-rowed. Cob rather large. Kernels large, dingy white. Plant about seven feet tall bearing its ears about twenty-six inches from the ground.

20. RURAL THOROUGHbred, Gregory. Ears eleven to twelve inches long, and one and seven-eighths to two inches in diameter, always tapering through the constant openness between the pairs of rows toward butt, the tip rarely well filled; mostly 8-rowed. Cob large. Kernels grouped in lateral pairs, large, dingy white. Plant about seven to eight feet tall, and bearing its ears about thirty-six inches from the ground.

†† Ear cylindrical in general, but swollen very noticeably toward butt, and tapering in lower third.

* Colored kernels.

21. **NEW ENGLAND EIGHT-ROWED.** Synonyms — *Canada*, of many; *Early Canada*, Gregory, Sibley; *Early Eight-rowed*, Sibley. Ears eight to nine and one-half inches long, and about one and three-eighths inches in diameter, pointed at tip; mostly 8-rowed. Cob small. Kernels rather large, of a golden orange color. Usually an openness between some of the pairs of rows at butt. Ear stalk large for its type. Plant about seven feet tall, and bearing its ears about twenty-four inches from the ground. It has many local varieties, differing more in impurity of seed than in any other respect.

22. **KILLAM**, Gregory. Ears ten to eleven inches long, otherwise answers to the New England Eight-rowed.

23. **LONG YELLOW**, Landreth. Ears ten to eleven inches long and about one and one-fourth inches in diameter, and at once distinguished from the New England Eight-rowed by this slenderness of ear, and by a dingier color.

24. **PENNSYLVANIA YELLOW**, Landreth. Same as the New England Eight-rowed, except the color is brownish yellow, and it does not fill well at tip, and also has a tendency toward openness between pairs of rows.

25. **IMPROVED KING PHILIP**, Ferry. This is the New England Eight-rowed, with a copper yellow kernel.

** Yellow kernels, red tinged.

26. **RED BLAZED**, Sibley. A sub-variety of the New England Eight-rowed, differing only in having the kernels on the lower portion only more or less tinged with red.

*** White kernels.

27. **WHITE FLINT**, Ferry, Thorburn, many farmers. Ears about nine to eleven inches long and one and one-half inches in diameter, usually tapering very decidedly in lower third to a not well filled tip; mostly 8-rowed. Cob medium small. Kernels of medium size, of a rather dingy white. Plant six to seven feet tall. A white form of the New England Eight-rowed.

Race B. Ear stalk medium to large. Ear tapering, kernels not rounded over butt, rounded, as deep as broad; usually 12-rowed. Color various,

† Ear strictly tapering, not swollen at butt. Cob white.

* Colored kernels.

28. **BLUE TWELVE-ROWED.** Resembles the Early Dutton in every respect except the one of color, which is a yellow red striped with blue kernels intermixed.

29. **CANADA TWELVE-ROWED.** Synonym — *Landreth's Earliest Yellow*, Landreth. Ears seven to ten inches long by one and three-eighths to one and one-half inches in diameter, rounded at the well filled tip; mostly 12-rowed. Cob largish. Kernels small medium, of a golden orange color. Plant six and one-half to seven feet tall, bearing its ears eighteen to twenty inches above the ground. Resembles Compton's Surprise, but smaller in ear and kernel. A more slender cob and a brighter color.

Certainly a very old variety. In 1535, Cartier found at Hochelega,

now Montreal, corn of which he says the kernels are "as great and somewhat bigger than small peason," and "it is as big as our small peason," which indistinct mention can be referred to this variety as well as to any other.

30. COMPTON'S EARLY, Sibley, Henderson. Synonym—*Compton's Surprise*, Thorburn. Ears nine to nine and one-half inches long and about one and five-eighths inches in diameter, a little pointed at tip; mostly twelve-rowed. Cob large. Kernels of medium size, light golden orange color. Plant about seven feet tall and bearing its ears about twenty-four inches from the ground.

31. EARLY DUTTON, Vaughan. Synonyms—*Dutton*, Henderson. *Early Summer Flint*, Landreth. *Pierce's Twelve-rowed Canada*, Vaughan. Ears seven to nine inches long and about one and three-eighths to one and one-half inches in diameter; a tendency to a sharper taper near the butt mostly twelve-rowed. Kernels but little smaller than Compton's Early, but the ear of less diameter, and the cob smaller. Color golden orange. Plant five and one-sixth to six feet tall. Resembles Canada Twelve-rowed quite closely, but distinguished by the sharper taper at the butt.

It was distributed from the United States Patent Office in 1848, and is stated to have been brought to Newport, N. H., from northern Maine in 1838. A 12-rowed yellow is also said to have been cultivated by the Norridgewock Indians of Maine a long time previous to the settlement of the Europeans, and is probably this variety, which perhaps is but a selection from the Canada Twelve-rowed as modified by climate.

32. NEW ENGLAND TWELVE-ROWED. Ears ten to eleven inches long and about one and five-eighths inches in diameter, abruptly tapering in butt portion, thence regularly to the rounded, usually not well filled tip; mostly 12-rowed. Cob large. Kernels medium to large, orange yellow. It seems to be a larger and stronger form of the Early Dutton, but is usually not well bred, and often shows Dutton type in its crop. Plant six to seven feet tall.

** Kernels white.

33. HOMINY, Bliss. Synonym—*Large White Flint*, Bliss. Ears eight to nine inches long and about two inches in diameter, strictly tapering, twelve to 14-rowed mostly, the ear stalk smaller than in the generality of the class. Kernels very compactly set, flinty white. Cob large, often red tinged in the interior.

†† Ear tapering, but swollen toward butt.

* Kernels colored.

34. DUTTON. Ears nine to ten inches long and about one and three-quarters inches in diameter, with rounded tip; usually 12-rowed, often more. Kernels largish, of a golden orange color. Cob large. Plant six to seven feet tall.

First brought into notice in 1818, from Cavendish, Vt., and said by Salisbury to be a sub-variety of the Golden Sioux. It is more probably the influence of climate and selection on some Canada 12-rowed sort, if as true it came from Vermont.

35. SMOKE DUTTON. Differs in no respect from the Dutton except in color, which is a dark copper red, the red in excess.

** Kernels white.

36. TWELVE-ROWED WHITE, of farmers in New York. This might be called White Dutton, for except the white color of the kernels it answers to the Dutton in description.

RACE C. Ear stalk small, cupped. Ear tapering, often strongly or even fusiform, and the kernels rounded more or less over butt. Kernel deeper than broad. Number of rows various; color various.

† Ear quite strongly tapering. Cob white.

* Kernels colored.

37. CHINESE GOLDEN, Gregory. Ear about six inches long and one and five-eighths inches in diameter at a point near the center of the ear, tip almost pointed; twelve to 16-rowed. Kernels very thick, rounded, of a golden orange color. Plant about five feet high, bearing its ears about twenty-four inches from the ground.

Said to have been in the Centennial exhibit of the Chinese Government in 1876. African maize, A, a variety received from Messrs. Landreth and grown at the Station in 1884, seems identical, while African maize E, 2, from same source corresponds in all but the color, which is white.

38. FRENCH YELLOW SIX WEEKS. Vil. Ear stalk medium large; ears four to six inches long and one and three-eighths inches in diameter, rounding at tip; fourteen to 16-rowed; kernels thick, of a deep orange color, the shade varying in different ears. Bears some resemblance to Chinese Golden, but the ear shorter the kernel smaller and less rounded, and the tips rounded.

39. AFRICAN MAIZE, E. 1. From Landreth & Sons. Ears about six inches long and about one and one-half inches in diameter in central portion, not quite as strongly tapering as the Chinese Golden; twelve to 14-rowed. Kernel light golden above, deep orange below, and bearing a short, sharp, stiff spine where the silk was attached; the kernel nearly a dent, on account of the thinness of the corneous matter at summit. Plant about four feet tall, and bearing its ears about nine to eighteen inches above the ground.

40. CUBAN. From South Florida. Ear about seven inches long and about two inches in diameter at about the center of ear, evenly rounded at the tip, which is well filled; fourteen to 16-rowed. Cob large. Kernels excessively flinty, but the starch approaching the summit of the kernel, which brings it almost intermediate in structure between the flints and the dents. Color bright golden yellow, with a lighter spot on the summit of each kernel.

†† Ear quite tapering. Cob red.

* Colored kernels.

41. FRANKLIN'S YELLOW. From N. C. Ears seven to eight inches long and about two inches in diameter at the center of the ear, a little pointed at tip, which is not covered; 16-rowed. Cob large. Kernels flinty, lighter golden orange at summit than below, in structure the starch approaches the surface so closely that indentation

frequently takes place. Like the Cuban it may be considered almost as intermediate between Flint and Dent.

42. **GOLDEN YELLOW**, Kan. Agr. Coll. Ear nine to ten inches long and about one and three-quarters to one and seven-eighths inches in diameter at the center of the ear, a little pointed toward tip which is bare; 12-rowed. Kernels regularly oval, yellow above, orange below, indented slightly through the thinness of the corneous matter at summit. It may be considered as almost intermediate to the Flints and Dents.

††† Ear fusiform, or tapering to both extremities. Cob, white.

* Colored kernels.

43. **TOPOVER**. An undistributed variety which has been originated in Nantucket, Mass., and so anomalous as to scarcely come in any of our descriptions. The ears seven to nine inches long and about one and one-quarter inches in diameter, nearly cylindrical, and rounding equally at butt and tip, or quite fusiform in many samples; 8-rowed, the ear stalk not as large as a pipe stem, and so buried in the surrounding kernels that on a casual examination, it is difficult to say which is the butt or the tip end. Kernels rounded evenly and strongly, broader than deep, very compactly set on the very small cob. Color golden orange. Plant six feet high, bearing its ears about eighteen inches from the ground.

I have placed it in this division provisionally, on account of the very small ear stalk, and the often tapering habit of the ears, tapering from the center to either extremity.

44. **JAPANESE STRIPED**, Vaughan. Ears about three inches long, and one and one-quarter inches in diameter, fusiform, or tapering from a point one third down the ear to both extremities; twelve to 16-rowed. Ear stalk set in a cup formed by the projecting kernels. Kernel deeper than broad, golden orange. Plant about four feet tall, suckering much, the first four leaves green, the rest beautifully striped with silvery white, or with rose-tinted stripes. Very late and very ornamental.

In the Gardeners' Chronicle, 1866, p. 145, this variety is said to have been brought to New York from Japan, in 1864, but in the same paper of date March 23, 1861, a firm advertises sixteen varieties of ornamental maize, many of which seem to include this style of plant.

The **FLINT CORNS** form a very well defined group, in general, but there are a few cases where the structure of the kernel seems to offer a passage way to the **DENTS**. It is unfortunate that I do not have access to larger collections. This attempt at classification includes the varieties offered by our leading seedsmen, and a few from farmers, but very many others are probably cultivated, and I cannot but regret the absence of numerous specimens from the great South and West. When the height of plant is given, and the distance of the ear from the ground, the figures refer to the climate of Geneva, N. Y., and the height of plant is quite variable even in the same garden in different seasons.

There seems a relation between the height of the ear from the ground and earliness, but the relationship cannot be considered as proven in our figures on account of the difficulty in giving exact expression to what varies in different plants and which must be averaged in results. One fact was observed, however, that the earliest plants to ripen their ears bore their ears nearer the ground than later ripening plants of the same variety in 1884. This observation offers a clue toward securing earliness in a variety, through the marking and saving for seed those ears in a crop which are borne nearest the ground.

ZEA * INDENTATA, THE DENT CORNS.

An agricultural species distinguished by section of the kernel which shows corneous matter on the sides only, the visible starch extending to the summit, and in the shrinkage which accompanies ripening drawing in the surface and thus producing a dent. In some the corneous matter extends strongly up the lateral sides nearly to the summit, and in these cases the shrinkage causes the dent to be of the form of a crease; in other cases the corneous matter does not extend to the summit, and the whole top of the kernel is dragged in, forming a wide dimple or broadened rounded crease, often a ragged dent, or a flap of projecting and doubled pellicle which forms a projecting tongue on the chit side; in other cases the corneous matter is strong all about the kernel and the dent becomes a rounded dimple or circular depression. In some few cases, the kernels toward the tip of the ear do not indent, yet retain their dent structure, the corneous matter nearly including the summit; in other rare cases these cases become apparently flint structured.

In this agricultural species, as in the FLINTS and SWEETS, three races can be distinguished, which we designate as before by the capitals A, B and C.

RACE A. Ear-stalk medium to large. Ear cylindrical, tapering in lower third. Kernels broader than deep.

* Kernels colored. Cob white.

1. BENTON YELLOW. Synonym — *Yankee*, of Michigan. Ears ten to twelve inches long, often longer, and I have seen the dry ear sixteen inches, about two inches in diameter, very squarish in sectional outline, often compressed somewhat at butt, and a tendency to openness between the pairs of rows; 8-rowed; kernel very large, flatly rounded, orange yellow above, orange below, creased dented. Cob large, often red tinged in the interior. Plant about seven feet high, bearing its ears about twenty inches from the ground. This variety is grown somewhat in Connecticut, Dakota and the Northwest, from which regions samples were received.

** Kernels colored. Cob red.

2. BRINDLE. Michigan Agricultural College. Ears seven to eight inches long, and about one and a half inches in diameter. Ear stalk medium small; ear not filling well at tip, rounding at butt, where the kernels project very distinctly on account of their shape; eight to 10-rowed; kernel distinctly polygonal, broadest at the central por-

tion, flat on top, which is small, thus causing a broad, deep and triangular sulcus between the rows. The color very peculiar, orange yellow in the dent, orange red in the rest of the kernel. Resembles Blount's Prolific very closely in shape of ear.

*** Kernels white. Cob white.

3. BALDWIN'S BRANCHING, Gregory. Ears six to eight inches long, and about one inch and a half in diameter, not rounded, but sometimes compressed at butt, pointed toward tip which is not filled; eight to 10-rowed; kernels broader near the center than at summit, rounded, forming a distinct but not broad sulcus between the rows, white on summit, dingy white below; cob rather large. Gregory says it commonly grows several stalks from one kernel, and is late.

Resembles Blount's Prolific quite closely in form of ear, but the kernel's are dingy white below instead of bright horny white, and the kernel shallower, thus forming a shallower sulcus.

4. BLOUNT'S PROLIFIC, Bliss, Thorburn. Ears six to eight inches long, and one and three-eighths to one and a half inches in diameter. Ear stalk rather small medium. Ear rather strongly pointed in lower third, to the not filled tip, not rounding at, but often compressed or slightly swollen at butt through extra kernels; mostly 8-rowed. Kernels very angular in outline, rather deep, and hence a broad and deep sulcus between rows, which are often grouped somewhat in pairs, white at the summit, glossy horny white below, crease dented. Cob small. Plant seven to eight feet tall, bearing its upper ears about fifty-four inches from the ground, often four to eight on a stalk, the lower ears shorter and more pointed than the upper.

5. PROLIFIC of Tennessee. Synonyms — *Blount's Prolific*, Gregory; *Improved Blount's Prolific*, Thorburn, Rural New Yorker. Ears seven to eight inches long, and about one and a half inches in diameter. Ear tapering a little in lower portion, not rounded over, but often compressed rounded at the butt, the tip not filled, usually 10-rowed, often 12-rowed. Kernels broadly rounded, broad at top, rather narrow at base, forming a distinct but shallow sulcus between the rows, crease dented. Plant about seven feet tall, and bearing its upper ears about fifty-four inches from the ground. Many ears form on a stalk, but the plant is too late to mature many of the lower ones, and scarcely the upper in this region. Very leafy.

Probably the original form from which Blount's Prolific was derived, and toward which Improved Blount's Prolific has been carried by selection.

6. BENTON WHITE. Ears ten to twelve inches long, and about two inches in diameter. Resembles Benton Yellow, No. 1, in every respect except the color, which is white near the summit of the kernel, and glossy horny white below. Like the Yellow it is almost invariably 8-rowed.

This variety varies sometimes to a flesh colored form. Indeed the white and the yellow in Connecticut are often grown mixed in the crop.

* Kernels w.

WHITE, Thorburn. Ears eight to nine inches three-quarters inches in diameter. Ear rounding up; eight and 10-rowed. Kernels large, broad, horny white below, creased dented. Cob large. 6 feet tall.

Also a flesh-colored, and a yellow form of this which is very impure, growing many 12-rowed along to Race B.

Kernel large, not cupped; ear tapering. Kernel as

above, white. Cob, white.

ORIGIN. Ears six to seven inches long, and about three inches in diameter. Ear compressed, rounded at tip, which is bare and projects; 12-rowed. Kernels creased dented, white. Plant twelve to fifteen feet high, bearing its ears very high up. Season late. Kernels, white. Cob, red.

WELVE-ROWED. Ears nine to ten inches long, three inches in diameter. Ear slightly tapering, pointed at tip, which is filled, 12-rowed. Kernels large, rounded on sides, orange-yellow below, long dimpled, quite cubical corners so that the sulcus is pronounced, but not deep. Plant about seven feet tall.

Kernels small to medium, cupped. Ear more or less rounded. Kernels deeper than broad. Color, yellow.

Cob, white.

Space between rows.

From Vaughan. Ears eight to nine inches long, one and three-fourths inches in diameter. Ear-stalk rather short. Ear tapering, quite strongly in lower half, blunt, pointed rounding at tip, which is uncovered. Kernels large, very deep, strongly rounded, forming a quite broad and deep sulcus between rows. Color, orange-yellow above, orange below, giving a very uneven appearance to the ear. The kernel long dimple dented, often appearing in kernels near tip.

Space between rows.

LOW, Vaughan. Synonym — *Sixty Day Dent*, seven inches long, and one and three-fourths to two inches in diameter. Ears tapering distinctly, blunt at the tip evenly, tip well filled; mostly a little polygonal, showing a narrow sulcus between rows. Color, orange-yellow above, orange below, dimple dented, small but rather deep. The sulcus well defined.

NORTH. Synonyms — *Sibley's Pride of the*

North, Sibley, Gregory; *Goddards Pride of the North*, Vaughan. Ears six to seven and one-half inches long, and about one and three-fourths inches in diameter. Resembles Wisconsin Yellow in every respect, except having a slimmer form of ear, and is perhaps only a more northern form; mostly twelve to 14-rowed. Plant about six and one-half feet tall, bearing its ears about twenty-four inches from the ground. One of the Earliest of Field Dents.

13. SMEDLEY, Sibley. Synonym — An unnamed from Michigan. Ears six to six and one-half inches long, and about one and one-half inches in diameter. Ear slightly tapering, rounded at butt, pointed at tip, which is well filled; both butt and tip peculiar looking from the projecting and pointed kernels; mostly ten to 12-rowed. Kernels deep, strongly polygonal, having a very broad and deep triangular sulcus between rows, very small at summit, dimple dented, lighter orange above than below. Cob, small; plant about six and one-half feet tall; season early.

The kernels all pitch or slope downward on the ear, and this with the deep sulcus, offers a very peculiar and characteristic appearance.

14. FARMER'S FAVORITE, Benson, Maule & Co. Synonym — *Farmer's Favorite Golden Dent*, Henderson. Ears eight to nine inches long, and about two to two and one-fourth inches in diameter. Ear slightly tapering in upper portion, more strongly in lower portion toward the tip, which is unfilled; fourteen to 18-rowed. Kernel a little deeper than broad, a little rounded polygonal, thus leaving a narrow sulcus between the rows, bright orange-yellow above, deep orange below, thick, large, long dimple dented, often roughened.

** No sulcus between rows.

15. QUEEN OF THE PRAIRIE, Gregory, Bliss. Ears six to eight inches long, and about one and three-fourths inches in diameter, slightly tapering, well rounded at butt, often rather pointed toward tip, which is unfilled; sixteen to 18-rowed. Kernels flat, deeper orange below than above, deeply creased dented, usually pinched; cob, smallish. Plant about nine feet tall, bearing its ears about forty-two inches from the ground.

16. NORTH STAR, Vaughan. Synonym — *Minnesota Dent*, of many New York farmers. Ears seven to eight inches long, and one and three-fourths to two inches in diameter. Ear often tapering quite strongly, nicely rounded at butt, a little pointedly at tip, which is often rounded and well filled; eighteen to 20-rowed. Kernel flat, yellow-orange above, orange below. Plant, six to seven feet tall.

17. HATHAWAY, Vaughan, Ferry. Ears six and one-half to eight and one-half inches long and two to two and one-quarter inches in diameter. Ear very slightly tapering in upper two-thirds, quite tapering in lower third, rounded evenly at butt and bluntly toward tip, which is unfilled; twenty to 24-rowed. Kernel narrow, yellow above, light orange below, long dimpled, often ragged or pinched dented.

18. LEAMING, Vaughan, Sibley, Prof. Lazenby. Synonyms — *Golden*, Landreth, Ferry; *Adams' Dent*, Prof. Beal. Ears seven to nine inches long, and one and seven-eighths to two inches in diameter. Ear slightly tapering in upper two-thirds, more strongly in lower third, often pointed at tip, which is unfilled; 18-rowed, more or less. Kernel thick, long dimple dented, sometimes ragged or pinched, bright orange yellow above, orange below, flat, some kernels slightly rounded at corners, forming an indistinct sulcus. Cob largish.

19. ILLINOIS YELLOW. Ears eight to ten inches long, and about two and one-fourth inches in diameter. Ear slightly tapering, with a slight increase of taper in lower third, nicely rounded at butt, evenly at tip, which is unfilled; sixteen to 20-rowed, or more. Kernel flat, yellow above, orange below, dimple, often ragged, dented. Cob medium or largish.

This appears to be quite generally grown in Illinois, and is the Yellow Dent of many New York farmers, and we can refer to it very many of the Yellow Dents of western farmers, and a number of local names, differing but in color or in minor characteristics.

20. MAMMOTH CHESTER COUNTY EARLY, Landreth. Ears nine to ten inches long, and two and one-half inches in diameter in center of ear. Ear strongly tapering, usually more rowed at butt than towards tip, nicely rounded at butt, often rather pointed at tip; twenty to 28-rowed. Kernels very deep, often more than twice as deep as broad, and two placed end to end equals or exceeds the diameter of the cob, yellow above, orange below, flat, dimple dented, often ragged.

21. CHESTER COUNTY GOURD SEED, Landreth. Synonyms — *Chester County Mammoth*, Sibley; *Premium Chester County Mammoth*, Bliss. Ears eight to ten inches long, and about two and one-fourth inches in diameter. Ear slightly tapering, rounding evenly at butt and tip, which is unfilled; sixteen to 20-rowed or more. Kernels deep, flat, light orange above, deep orange below, medium large, deeply creased dented, often ragged. Cob large. Plant about seven feet tall. Ear always slimmer than No. 20.

CHESTER COUNTY MAMMOTH, Vaughan, Thorburn, Gregory, Ferry. Synonym — *Cloud's Early Mammoth Chester*, Landreth. Ears seven to eight inches long and two and one-quarter to two and one-half inches in diameter. Ear slightly tapering, rounded evenly at butt and tip; eighteen to 30-rowed. Kernels deep, narrow, thick, flat, light orange above, deep orange below, dimple dented. Cobs large. Plant eight to nine feet tall, bearing its ears forty-two to forty-eight inches from the ground.

†† Kernels colored, not yellow.

|| Cob white.

* A sulcus between rows.

23. SOUTHERN PROLIFIC, Sibley. Synonym, *Evan's Mo. Agr. Coll.* Ears nine to ten inches long and about two and one-quarter inches in diameter. Ear very slightly tapering, rounded at butt, rather pointed towards tip, which is unfilled; fourteen to 18-rowed. Kernels very deep, rounded polygonal, thus leaving a sulcus between

rows. Light golden yellow just on summit, deep orange red below, long dimple dented, but usually ragged or pinched.

|| Cob red.

* A sulcus between rows.

24. FOX OR LITTLE PREMIUM, Sibley. Ear eight to eight and one-half inches long, and two inches in diameter. Ear slightly tapering, rounding at butt and at tip, which is not well-filled; 16-rowed mostly. Kernel slightly deeper than broad, polygonal, dimple dented, often ragged or pinched. Orange red above, red brown below.

Grown in southern Illinois.

25. GOODWIN'S RED. From N. C. Ear eight to eight and one-half inches long, and two inches in diameter. Ear slightly tapering, a little pointed toward tip, which is not filled; fourteen to 16-rowed. Kernel broadly oval, small at summit, which is flat and dimple dented, of a red purple color above, changing to orange reddish below.

UPCHURCH'S RED. From N. C. Ears eight to eight and one-half inches long and two inches in diameter. Resembles in outline Goodwin's Red, but the kernel very deep, narrow, flat, with scarcely rounded corners. Purple in upper third, and changing to a red orange in lower portion.

+++ Kernels striped.

|| Cob white.

* A sulcus between rows.

27. CHEROKEE. From Wisc. Ear seven to eight inches long, and about two inches in diameter, very slightly tapering, rather pointed in lower fourth; 16-rowed. Kernels deep, flat, rounded a little toward corners, thus forming a narrow but well defined sulcus, yellowish white, beautifully striped longitudinally with red, creased, dented, sometimes pinched.

|| Cob red.

* A sulcus between rows.

28. UPCHURCH'S STRAWBERRY. From N. C. Ears eight to nine inches long, and about two and one-quarter inches in diameter. Ear regularly tapering, rounded at butt, bluntly rounded at tip, which is unfilled; fourteen to 16-rowed. Kernel deep, broadly oval, with a small, feebly indented summit, and a broad and deep sulcus between rows, honey white, longitudinally striped with red. A variety from Missouri has purple-red husks. Whether this has or not I do not know.

** No sulcus between rows.

29. STRAWBERRY. From N. C. Ear eight to nine inches long, and about two and one-quarter inches in diameter. Ear evenly tapering to near the tip, where it sharpens. Tip not filled; sixteen to 18-rowed. Kernels rather rectangular in outline, honey white, longitudinally striped with red. Cob red tinged rather than red. Similar ears from Missouri have purple-red husks. Whether this has or not, I do not know.

Resembles at first sight Cherokee, but the ear is larger, the color lighter, and no true sulcus can be made out.

++++ Kernels white.

|| Cob white.

* A sulcus between rows.

30. **MARYLAND PROLIFIC**, Sibley. Ear about seven inches long, one and seven-eighths to two inches in diameter. Ear tapering a little scarcely rounded at butt, roundly at tip, which is unfilled; 16-rowed. Kernels rounded at upper portion so as to form a rather broad and medium deep sulcus between the rows, white above, horny white below, lightly dented, often not at all toward tip.

31. **WHITE DENT**, SIBLEY. Ears seven to eight inches long, and about one and three-quarter inches in diameter at center of the ear. Ear tapering, shortly rounded at butt, rather pointed toward tip, which is unfilled; 16-rowed. Kernel flat, sufficiently rounded at corners to form a recognizable sulcus, long dimple dented, often not indented in lower portion of ear. Very similar to, if not indetical with No. 30.

32. **CAROLINA SHOE PEG**. From N. C. Ear about seven inches long, and one and three-fourths inches in diameter. Ear slightly but evenly tapering, evenly rounded at butt and tip, the unfilled tip projecting; sixteen to 20-rowed. Kernel deep and narrow, rounded in upper portion to a flat dented summit, thus leaving a rather broad sulcus between rows, white above, horny white below. Cob small.

From same collection as Shoe Peg, but quite distinct.

33. **WATSON**. From Tenn. Ear seven to eight inches long, and one and seven-eighths inches in diameter. Ear tapering, rounding at butt, and evenly at tip, which is unfilled; twelve to 16-rowed. Kernels rounded in upper half to a small flat dimpled surface, thus forming a broad sulcus between rows, usually slightly indented towards lower portion of ear, and not at all at tip, white above, horny white below.

This variety often appears in crops of Blount's Prolific.

34. **SIBLEY'S MAMMOTH**, Sibley. Synonym — *Common Tennessee*, A. G. Willey. Ears nine to ten inches long, and two and one-quarter inches in diameter. Ear slightly tapering, compressed rounded at butt, evenly rounded at tip, which is unfilled; fourteen to 16-rowed. Kernels white at summit, horny white below, long dimpled dented, often pinched, flat, rounded at the corners, and forming a rather broad sulcus.

Resembles Maryland Prolific, but the ear is longer, and more slender.

35. **CARY No. 2**. From N. C. Ear ten to ten and one-half inches long, about two and three-eighths inches in diameter. Ear tapering evenly; abruptly rounded at butt, a little pointed toward tip; sixteen-rowed. Kernels large, deep, widest at the center, thus forming often a rather broad and deep sulcus between rows; white above, horny white below, not broad at summit, dimple dented.

From same collection as Cary No. 1, and a distinct form.

36. LONG TOM. From N. C. Ear ten and eleven inches long and about two and one-eighth inches in diameter in middle portion.

Ear tapering, little rounded at butt, the tip unfilled; sixteen to 18-rowed. Kernels rounded in upper portion, very deep, broad, thick, dimple-dented; white above, and horny white below.

Found in the same collection with the Crowder, but very distinct.

** No sulcus between rows.

37. AFRICAN, E. 3. Landreth. Ears five to six inches long, and about one and five-eighths inches in diameter. Ear slightly tapering, rounding over butt, rather pointed at tip, which is unfilled; fourteen-rowed. Kernel slightly deeper than broad, thick, small, dimple-dented. Plant about five and one-half feet tall, bearing its ears about twenty-four inches from the ground.

The same flint kernels planted produced one flint ear of the same description, about half dent ears as here described, and about half of a very peculiar form of the same description, but the kernels armed with a short, sharp, stiff spine where the silk was attached.

38. ADAMS' EXTRA EARLY, Sibley, Landreth. A smaller form of Adams' Early, the ears four and one-half to five and one-half inches long, about one and five-eighths inches in diameter; ten to 14-rowed, otherwise the same description. Plant three and one-half to four and one-half feet tall; ears borne about eighteen inches from the ground.

39. ADAMS' EARLY, Sibley, Henderson, Ferry. Ears six to seven inches long, about one and three-quarter inches in diameter, slightly or strongly tapering, rounding at the butt; twelve to 16-rowed, the rows often spirally or irregularly arranged. Kernel slightly deeper than broad; white above, horny white below, long dimple-dented or creased. Cob, large. Plant five and one-half to six and one-half feet tall, bearing its ears about twenty-four inches from the ground.

40. BESSARABIA. From Massachusetts; also from Professor Lazenby, O. Synonymous with *Maryland White* received from Maryland, and "*Common*" from Tennessee. Ear seven to eight inches long, and about two and one-half inches in diameter. Ear regularly tapering, a little rounded at butt, and bluntly toward the tip; which projects and is unfilled; twenty to 24-rowed. Kernel very deep and narrow, not close-set laterally; white above, horny white below, dimple-dented, often pinched to a tongue. Plant eight feet tall.

The samples grown in Massachusetts as is stated from seed received from Russia.

41. WHITE MARYLAND GOURD SEED, Landreth. Synonyms, *Thompson Dent*, Mo. Agr. Coll., and also "*Common*" from Tennessee. Ear seven to eight inches long, and two and three-eighths inches in diameter. Ear tapering, rounded at butt and at tip, which is unfilled. Sixteen-rowed. Kernel, white above, horny white below,

long, dimple-dented, often pinched flat. Plant about nine feet tall, and bearing its ears about forty-eight inches from the ground.

42. SHOE PEG. From N. C. Ear about seven inches long, and two inches in diameter. Ear slightly tapering, rounded evenly at butt and tip, the latter unfilled and projecting; sixteen to 20-rowed. Kernel very deep and narrow, flat, deeply dimple-dented; white above, honey white below.

43. CARY No. 1. From N. C. Ears about ten to eleven inches long, and two and three-eighths inches in diameter. Ear slightly tapering, nicely rounded at butt, rather pointed toward tip, which is unfilled. Kernels very rectangular in outline, flat; white above, horny white below, deeply dimple-dented. Cob, white, often slightly buff tinged.

44. THE CROWDER. From N. C. Ears ten to eleven and one-half inches long, and about two and a quarter inches in diameter. Ear often strongly tapering, rounded at butt, a little pointed toward tip, which is unfilled; sixteen to 18-rowed. Kernel broad, flat, rectangular in outline, set loose laterally; white above, horny white below, long, dimple-dented, often ragged or pinched.

|| Cob, red.

* No sulcus between rows.

45. ILLINOIS WHITE, Professor Lazenby. Synonyms — *Whitney Corn*, Mich. Agr. Coll.; *White Dent* from Connecticut. Ear eight to nine inches long, and about two and a quarter inches in diameter. Resembles Illinois Yellow in all but color.

46. PARRISH, Vaughan, Landreth. Ears eight to nine inches long, and about two and a quarter inches in diameter. Ear tapering more quickly toward the tip, which is not filled; fourteen to 18-rowed. Kernel very deep, flat, rectangular in outline, spaced between rows, deeply, long, dimple-dented; white above, honey white below.

Resembles Farmer's Favorite in appearance of ear, but not in color.

47. PROCTOR'S BREAD. Mo. Agr. Coll. Ears eight to nine inches long, and about two and three-quarter inches in diameter; ear tapering, rounded at butt, abruptly pointed toward the large projecting unfilled tip; twenty to 24-rowed; kernel flat, white above, honey dingy white below; cob not large.

I am sorry that I have no more material for studying this interesting class. In general, each variety is determined from quite a number of collections from different sources, and includes many not as yet recognized by seedsmen. If errors occur, it is from the selections sent me by the seedsmen, and supposed, to represent the crop. It must be remembered however, that the seed is little improved, and scarcely any that will yield a crop of unmixed type, but the majority of the ears, it is to be supposed, will answer to the description, and the variety once recognized, it can be carefully selected for seed, and thus year by year the variety will become purified.

ZEA * AMYLACEA, THE SOFT CORNS.

An agricultural species which is characterized by the starchy appearance of the split kernel, no corneous matter being present.

RACE A. Ear stalk medium or largish; ear cylindrical; kernel broader than deep, rounded.

* Cob, white.

1. RED RIVER. From Manitoba. Ears three to five and one-half inches long, and about one and one-quarter inches in diameter; ear not rounded at butt; nor filling at tip; strictly 8-rowed; kernel much rounded, thick, not indented; color, white; plant three and one-half feet tall, bearing its ears about one-quarter inch from the ground; early.

This is probably *Zea Mays*, var. *præcox*, Nutt, or Early Mandan.

2. SQUAW. Synonym — *Mandan*, Vaughan. Ears six to nine inches long, and about one and three-eighths inches in diameter, of cylindrical type, yet often appearing to taper from crowded kernels; not rounded at butt, nor filled at tip; 8-rowed; kernels of various colors on same ear, such as white, blue, purple, reddish, yellow, etc.; plant four to five feet tall, bearing its ears two to three inches above the ground.

The ears are often irregularly rowed, and many ears poorly formed, but the plant is early and exceedingly prolific; the variety seems to have been described by Salisbury, in 1848, as a flint, much grown by the Indians of Michigan, with white kernels and white cob. Vaughan writes me that it is the Squaw of Michigan, and in his seed catalogue says it is originally from the Upper Missouri in Dakotah.

3. OMAHA. Synonym — *Nebraska Black*. Ears eight to nine inches long, and one and one-half to one and three-quarters inches in diameter; 8-rowed, with a tendency toward ten rows at butt, the rows close and not open as in Tuscarora; kernel large; the color is various, some ears blue, others slate black, others white, other red, etc.

4. ZUNI PURPLE-SPOTTED, F. H. Cushing, Zuni Indians. Ears six to seven inches long, and about one and one-half inches in diameter. Ear cylindrical in upper two-thirds, often tapering in the lower portion to the unfilled tip; ten to 12-rowed; kernel often indented; color, a white ground with purplish specks, but much mixture of colored kernels; plant five feet tall, bearing its ears about eighteen inches from the ground; many ears of other types in the crop.

** Cob, red.

5. TUSCARORA. Synonyms, *Zea erythrolepsis*, Bonarous. Ears eight to ten inches long, and one and three-quarters to two inches in diameter, of cylindrical type, but usually tapering through the openness between the pairs of rows toward the butt; 8-rowed; kernels very large, creamy white, frequently creased at the summit; plant six to seven feet tall, and bearing its ears eighteen to twenty-four inches from the ground.

This variety was brought to New York by the Tuscarora Indians in 1712, when they emigrated from North Carolina, and it is sup-

posed to be the variety under Indian culture at the time of the settlement. It is recorded by Bonafous as grown upon the Missouri river, and a yellow variety is mentioned in North Carolina in 1849, and a reddish white variety in Arkansas in 1849.

RACE B. Ear stalks small to medium, often slightly cupped; ear tapering; kernel as deep as broad, slightly rounded.

I form this race with great reluctance, as it is formed but from individual ears found growing with other kinds of corn, and from analogy with the divisions that occur in the other species. I include here, provisionally, certain Zuni Indian corns, which do not entirely coincide, and are in certain aspects abnormal. The crops were all much mixed, and the descriptions are from the prevailing ears. While in special aspects they belong to Race C, yet the general appearance seems to ally them to this race.

* Cob white.

6. ZUNI WHITE, F. H. Cushing. Ears seven to nine inches long and about one and three-fourths to two and one-fourth inches in diameter. Ear stalk medium, slightly or not at all cupped; ear tapering, often rounded very strongly at butt; 16-rowed. Kernel often slightly deeper than broad, very firmly set, flat on the edges through pressure, giving a crystal like aspect to the polished kernels. Plant about five and one-half feet tall, bearing its ears about fifteen inches from the ground.

The color of the kernels is much mixed on many ears; some ears beautiful red purple and pink purple, without mixture.

7. ZUNI YELLOW, F. H. Cushing. Ears seven to eight inches long and about one and one-half to one and three-fourths inches in diameter. Ear stalk rather small, sometimes more or less cupped. Ear tapering from a point one or two inches from the butt both ways. Kernels often slightly deeper than broad, with a sort of crystalline appearance from the flat sides being in different planes, of a lemon yellow color, but many kernels of other colors, and chocolate brown quite prevalent. Plant about seven feet tall and bearing its ears twenty-four inches from the ground.

** Cob purple.

8. ZUNI BLUE, F. H. Cushing. Ears eleven to twelve inches long and about one and seven-eighths to two inches in diameter. Ear stalk medium small, often a little cupped. Ear in general evenly tapering, often quite tapering; fourteen to 16-rowed. Kernels rounded at summit, rather thick, sometimes dented, color light blue.

9. ZUNI PURPLE, F. H. Cushing. Ears six to eight inches long and one and one-half to two inches in diameter. Ear stalk small, often cupped. Ear tapering, often strongly, rounded at butt, ten to 16-rowed. Kernels slightly deeper than broad, very firmly set and bevelled on the sides, as in the other Zunis, of a reddish purple color. Cob purplish. Plant about five feet tall, bearing its ears twelve inches from the ground.

10. ZUNI BLACK, F. H. Cushing. Ears eight to ten inches long and about one and one-half inches in diameter. Ear stalk medium,

often slightly cupped. Ear tapering a little in upper portion, strongly in lower; fourteen to 18-rowed. Kernel often a little deeper than broad, flattened on sides in different planes, thick, deep purple black, some kernels indented. Cob bright purple. Plant about six feet tall, bearing its ears eighteen inches from the ground.

RACE C. Ear stalk small. Ears tapering. Kernels deeper than broad.

11. MUMMY. From Peruvian Huacas. The samples, originally from the Peabody museum, and verified from a sample seen in possession of Professor Goodale, of Cambridge, in 1878, answer to the description of samples in the Smithsonian museum. Ears about four inches long and two inches in diameter, cone form, or strongly tapering from the large and rounded butt; 18-rowed. Kernel flat, slightly rounded at corners, slanting downward a little, rather rectangular in outline, indented and resembling in appearance a dent. Color brown, probably through age.

Garcilasso de la Vega speaks of a kind of corn in Peru called *Capia*, which is "tender and highly esteemed." Rivers and Tschudi say the Peruvians worshipped the ears, "the grains of which were of various colors, or were arranged in rows united in the shape of a cone." Hence this variety is doubtless one of the sacred corns of ancient Peru, and naturally the one selected for entombment.

12. Cuzco. In the valley of Cuzco, Peru, and only there, as Vilmorin believes, this variety is grown in various colors, the white only having reached our seedsmen. The kernels are very large, often seven-eighths of an inch long by five-eighths of an inch broad, rounded pointed at the summit, and creased. The plant grows fourteen feet tall, or in California to nineteen feet. In all attempts at growing, by ourselves, the plants have perished from smut before the ears were formed. We have never seen an ear, and only place it in this division on account of the kernels being deeper than broad.

The soft corns appear to be but little grown in the United States, and our collections do not afford us many varieties. Our classification may, therefore, be considered as provisional only. Larger collections would undoubtedly give us better illustrations for Race B and probably some of Race C class are at present grown in tropical America, one of which may be identified possibly with the *Maizium* of Peter Martyr.

ZEA * EVERTA, THE POP CORNS.

An agricultural species in which the corneous matter is in excess, the starchy matter often entirely absent. Upon exposing the dry kernel to a high temperature, the whole seed explodes into a white, fluffy mass, the interior structure being everted about the chit and epidermis. Kernels small, very hard and flinty, the silk scar usually very noticeable.

RACE A. Ear stalk medium. Ear cylindrical, not rounded at butt. Kernel broader than deep, rounded. A fine line of visible starch often observable about the chit.

* Cob white.

1, NEW ENGLAND. Synonym — *Nonpareil*, Gregory. Ear six to eight inches long, and about one inch in diameter; 8-rowed. Kernel glossy, rounded. Plant five to six feet tall, bearing its ears about sixteen inches from the ground.

A white and a yellow variety occurs, but in general yellow and white kernels on the same ear; a deep purple form is also sometimes found grown, but the cob more or less red tinged.

RACE B. Ear stalk medium. Ear tapering more or less strongly, but usually nearly cylindrical in upper portion. Kernel as deep as broad.

* Cob white.

2. SILVER-LACED, Gregory. Ears five to six inches long, and about one inch in diameter, rather evenly tapering; mostly 12-rowed. The line of starch about the chit very fine, and in most cases absent. Color a translucent whitish.

A yellow and a purple kernelled variety is sometimes found, the latter with a red tinged cob.

3. COMMON TWELVE-ROWED. Synonym — *Small White*, Salisbury. Ears six to seven inches long, and about one and one-eighth inches in diameter, but little tapering; mostly 12-rowed. The kernels have usually a light line of starch about the chit. Color a translucent whitish.

A yellow form also occurs.

RACE C. Ear stalk small, cupped. Ears tapering, often very strongly. Kernel deeper than broad (with few exceptions.)

† Ear of oval form.

* Cob white.

4. DWARF GOLDEN. Ears three-quarters to two and one-half inches long and five-eighths to three-quarters of an inch in diameter, very oval in outline through the even rounding at butt and tip, and cylindrical in central portion; twelve to 14-rowed. Rows often irregular or spirally arranged. Kernels nearly round, of a bright, golden yellow. Plant about eighteen inches tall, bearing its ears about two inches from the ground, and very early.

This seems to be the *Mais a poulet* of Vilmorin.

5. GOLDEN, Gregory. Synonyms — *Quarantino*, of Europe; *Cobbett's Corn*, of England. Ears three and one-half to four inches long and about one to one and one-eighth inches in diameter, tapering very slightly, and bluntly rounding at butt and tip, of ovoid form, but less oval than in the Dwarf Golden; twelve to 14-rowed. Kernels deeper than broad, rather flat on surface, bright golden orange. Plant about three and one-half feet tall, bearing its ears about twelve inches from the ground. Early, but not as early as Dwarf Golden. A little variable in size of ear. A form with black kernels is also found, called *Black Pop*.

†† Ears very slightly tapering.

* Cob white.

5½. **SMALL PEARL.** Ears about four and one-half to five inches long and one inch in diameter, tapering both ways from a point toward the upper third of ear. Kernels as deep as broad, very closely set, compressed, very dense; twelve or more rowed. Very distinct from Pearl No. 7.

6. **MINIATURE, Thorburn.** Ears about four and one-half inches long, and three-quarters inches in diameter, tapering very gradually, often curved, tip rarely well filled; mostly 16-rowed. Kernels triangular, very small, white, very flinty.

7. **PEARL.** Ears about four to five inches long and three-quarters to one inch in diameter, nearly cylindrical, the kernels very much compressed and flat; mostly 14 to 18-rowed, rounding at butt and tip rather abruptly. Kernels much deeper than broad, triangular, very flinty.

White and lemon yellow forms occur, and deep purple with red cob; also bluish, and ears with upper surface of kernels dead white.

††† Ears strongly tapering.

* Cob white.

8. **BLUE.** Ears six to eight inches long and about one inch in diameter; strongly tapering in lower portion; fourteen to 18-rowed. Kernels triangular, deeper than broad, very flinty, of a slate blue color.

†††† Ears strongly tapering, kernels beaked.

* Cob white.

9. **EGYPTIAN, Gregory.** Synonym—*White Rice*. Ears four to seven inches long and one and one-quarter to one and one-half inches in diameter, strongly tapering, often cone form, many rowed. The kernels the shape of a rice kernel, with a sharp projection where the silk was attached, and sloping downward more or less. Color white. Plant about five feet tall, and bearing its ears about thirty inches from the ground.

Varieties occur with amber, honey yellow, yellow and reddish kernels, with white cobs; and red purple, and almost black purple kernels, with red cobs.

ABNORMAL FORM.

10. **BEAR'S FOOT, Harris.** A variety of the Egyptian, introduced by Joseph Harris, seedsman, of Rochester, in 1885, as a novelty. The ear becomes flattened and in form resembles a bear's paw. As a monstrosity, this freak is by no means a rare one, but if a variety, as is claimed, it offers illustration of the power of selection in perpetuating an abnormal form.

The pop corns present a great many varieties, so far as color of kernel and size of ear is concerned, but the seed is generally so affected with cross-fertilization as not to generally furnish ears on type, except in those few varieties which are grown commercially. Thus a White Pearl may yield four or five distinct colors, or even rice ears; the New England Pop usually bears some ears of common Twelve-rowed, etc. When the seed is pure, the pops, however,

yield with trueness to type. We have preferred describing but a few typical varieties, but a collection could be easily made which would count large numbers, and present many points of minor divergence. The species is a very distinct one, and a pop corn cannot be readily confounded with a flint or any other species, and the races are more readily distinguishable to the eye than by description.

ZEAL MAYS L. Var. VAGINATA, the Pod CORNS.

There is a class of corns which deserve description by themselves from their peculiarity of bearing each kernel, as well as the ear, inclosed in a husk. These are the Pod CORNS, also called Husk corn, Texas corn, Paraguay corn, Oregon corn, Rocky Mountain corn, Wild corn, California corn, Cow corn, etc. These, through the structure of their kernels and the shape of their ears, can be referred to their several agricultural species, so far as we have had sample ears. Thus far we have had specimen ears of Sweet, Flint and Dent corns of the pod variety, and we have known of two cases where a few podded kernels have appeared in crops of the Canada type of corn, and have been told, authenticated by specimens, of the occurrence of fully podded ears in crops from Blount's Prolific dent seed. As yet, however, our collections have been insufficient for a careful study.

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* Synonyms in Italics.

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REPORT

OF THE

HORTICULTURIST.

INTRODUCTION.

The chief work attempted in the station garden the past season has been :

1st. The continuation of our test of varieties and the determination of synonyms.

2d. Testing seeds gathered at different stages of maturity ; from different parts of the plant ; and seeds maturing at different times ; in order to note the influence of these conditions upon the resultant plants.

3d. A continuation of the testing of insecticides ; and

4th. Making an examination of the root systems of our garden plants.

Besides this general work, many special experiments have been performed upon the different crops grown in the garden, the details of which will appear in the proper places.

In the first division of our work, we have been greatly aided by a gift from Messrs. Vilmorin, Andrieux & Co., of Paris, of about five hundred varieties of vegetable seeds. The efforts that these gentlemen have made in establishing synonyms in their own trial grounds is the very best certificate that the seeds received from them are both true to name, and of distinct varieties. We have thus felt secure in using these varieties as standards with which to compare others of doubtful purity.

A more favorable season, and the acquisition of many new varieties have enabled us to carry the work of description and classification much further than was possible in 1883. The results of our work, though gradually assuming shape, are not as yet sufficiently complete for presentation.

The Importance of Accurate Nomenclature.

We need hardly say that it is extremely desirable that each variety of vegetable should be known among both seedsmen and

gardeners under one distinctive name. In our study of vegetables during the past three years, we have frequently been surprised to find how well the distinguishing characters of vegetables are preserved through the carefulness exercised by seed growers, even within species in which the varieties tend constantly to cross-fertilize. We find that in the great majority of cases, where we have a carefully prepared description of a given variety, the seed purchased under that name produces plants of which the principal characters agree with the description. Our own experience teaches us that in many of our garden vegetables, conformity to type can only be secured by the most careful selection and separation of seed plants. With these what seem difficult results so well attained, it seems a great pity that the benefits of this careful seed breeding should be so largely lost through the prevailing careless system of nomenclature. We are dwelling somewhat largely upon this subject, because it seems to us that its importance demands reform. We need only to refer the reader to the paragraph on the French Forcing carrot, on p. , and upon the synonyms of early peas, p. of this report for an example of the truth of our statements.

It is evident that reform in a nomenclature that has once become confused can only be accomplished through the agreement of those who disseminate the seeds. It has seemed to us, that one of the most valuable works that can be carried on at our station is an attempt to establish a true nomenclature and description of the varieties of vegetables grown in our country, and the bringing together as synonyms all the names that are applied to each individual variety. This is a work of magnitude, and one that requires much careful observation. It is also a work that necessitates the study of many varieties under different conditions of soil and climate.

It is our earnest hope that the work we are undertaking may approve itself to those interested in the subject, both from its intrinsic importance, and the careful manner in which we are endeavoring to perform it. We shall esteem it a favor if any person well informed upon varieties in any garden vegetable, who discovers an obvious mistake in our decisions, will communicate the fact to us. Also, we desire that any grower of vegetables who is led to suspect that any two names are synonyms should inform us of the fact that we may verify his opinions. Finally, we shall be much pleased to discover that through the influence of our work in this direction, the names of varieties in the catalogues of our seedsmen are gradually becoming simplified and of uniform wording.

In the second division of our work we found difficulties through the cross-fertilization of varieties that rendered our experiments nearly useless in the case of the onion, radish, beet and carrot. These difficulties were not entirely unexpected. The seeds used were, of necessity, gathered from the Station garden, and in attempting duplicate experiments with different varieties we incurred the danger of cross-fertilization. In some other vegetables also the differences in results are so obscure as to suggest no deductions; but

amid these discouragements we find sufficient hope in the outcome of a few plantings to give the impression that our efforts in this direction promise valuable results, and justify further experiments upon a larger scale.

Our experiments with insecticides have been rewarded with a reasonable degree of success.

We desire here to acknowledge our indebtedness to our Assistant, Mr. O. E. Liess, whose faithfulness in taking notes and ready zeal are deserving of favorable mention.

Abbreviations:

As we have frequent occasion to mention the names of seedsmen, we will use the following abbreviations in order to economize space. When one of these is attached to the name of variety, it indicates that the seed was obtained from the party corresponding to the abbreviation. When a date is also appended, it indicates that the seed was obtained in the year specified. When no date is appended it is understood to be 1884.

B. M. & Co.	Benson, Maule & Co., Philadelphia, Pa.
Batch.	D. Batchelor, Utica, N. Y.
Ben.	Ernst Benary, Erfurt, Germany.
Bliss.	B. K. Bliss & Sons, 34 Barclay St., N. Y.
Clev.	A. B. Cleveland, Cape Vincent, N. Y.
Dam.	Damman & Co., Italy.
Fer.	D. M. Ferry & Co., Detroit, Michigan.
Greg.	J. J. H. Gregory, Marblehead, Mass.
Hen.	Peter Henderson & Co., 35 & 37 Cortland St., N. Y.
Hors.	F. H. Horsford, Charlotte, Vt.
Lan.	David Landreth & Sons, Philadelphia, Pa.
Sib.	Hiram Sibley & Co., Rochester, N. Y.
Till.	I. Tillinghast, La Plume, Pa.
Thor.	J. M. Thorburn & Co., 15 John St., N. Y.
Vil.	Vilmorin, Andrieux & Co., Paris, France.

"*Gard. Chron.*" is used as an abbreviation for the "Gardener's Chronicle, London; *Fr.* is used as an abbreviation for French, *Ger.* for German, and *Syn.* for synonym.

BEET. — TEST OF VARIETIES.

We tested the past season eleven so-called varieties of garden beet, one of Chard, fourteen of Mangel Wurzel, and eleven of Sugar beet. The seeds were planted April 24, in rows ten feet long; two rows each of the garden beets and chard, and one of the Mangels and Sugar beets. In order to ascertain the percentage of vegetation, one hundred seed cases from each package were carefully counted in.

The soil was manured with a moderate application of stable manure. The rows of garden beets and chards were twenty-one inches apart, and those of the Mangels and Sugar beet twice that distance, or three and a half feet apart. The plants were thinned to six inches apart in the row. We present the time required for vegeta-

tion, the number of plants vegetated, and the number and average weight of the roots harvested in each variety, as follows:

	First vegetation in — days.	Per cent vege- tated.	Number of roots harvested.	Average weight of roots — ounces.
<i>Beet :</i>				
Dark Red Pyriform or Strassburg.....	14	88	39	11
Dwarf Deep Blood Red.....	14	74	28	6
Knaver's Improved Imperial.....	14	47	33	12
Landreth's Very Early.....	14	65	41	8
Long Blood Red.....	14	107	44	9
Long Yellow.....	12	95	42	8
Red Covent, garden.....	14	38	33	3
Red Flat Treviso.....	16	56	42	5
St. Osyth.....	12	101	40	6
Swiss Chard	12	123	..	..
Whyte's Very Deep Blood Red.....	12	102	39	10
Yellow Castelnaudary.....	12	55	33	5
<i>Beet-Mangel :</i>				
Golden Tankard (Greg.).....	12	99	17	20
Golden Tankard (Vil.).....	12	91	14	26
Long Red	11	98	13	30
Long White Red Top.....	11	96	18	25
Long Yellow White Flesh.....	11	102	13	33
Long White Green Top.....	11	122	15	40
Negro Red Fleshed.....	11	67	12	48
Orange Globe.....	11	86	14	41
Red Globe.....	11	107	16	27
Red Oxhorn.....	11	94	16	28
Webb's New Kinvers' Yellow Globe...	11	107	17	2
Yellow Globe (Vil.).....	11	84	14	24
Yellow Globe (Fer.).....	11	74	16	25
Yellow Mammoth.....	11	80	15	48
Yellow Ovoid Barre's or Intermediate.	11	43	14	33
<i>Beet-Sugar :</i>				
Early Red Skin	11	80	16	23
German Small Rooted.....	11	122	16	29
Grey Top.....	11	99	17	15
Vilmorin's Improved White.....	11	88	13	14
White Green Top.....	13	37	18	21
White Green Top Brabant.....	11	79	13	19
White Red Top.....	11	83	14	20
Yellow Hesbaye.....	11	97	16	25

It will be observed that in the garden beet, the average weight of the roots is decidedly less than in the Sugar beet or mangel, also that in the Vilmorin's Improved Sugar beet, which is noted for its richness in sugar, the roots average less in weight than in the other

varieties of Sugar beet. In the beet, richness in flavor, and in sugar accompany small size, hence in choosing a variety for table use, we should not necessarily select the most productive one.

We do not note the comparative earliness of the different varieties, owing to the difficulty of securing a fair standard for comparison. We note however a rule which seems to apply pretty well with all the garden roots, and to the onion also, viz., the more depressed the root or bulb, or in other words, the "flatter" it is, the more rapid is its development.

By planting several samples of seed grown in the station garden in the summer of 1883, we learned the important fact that the varieties of this vegetable cross-fertilize by natural agencies, and hence can only be kept pure when grown separated some distance from each other. We made experimental plantings with seven varieties, sowing the earliest, and the latest ripening seed of each in adjoining rows. The mixed condition of the crop renders deductions unsafe. We note however that the earliest ripe seed gave on the average considerably larger vegetations than the later, and that the largest percentage of vegetation secured from any of the beets was from a planting of the Early Blood Turnip variety, the seed of which was gathered very green.

The Use of Salt as a Fertilizer.

Common salt is often recommended as a fertilizer for the beet. In order to test its efficacy, we applied to ten rows of the Half Long Blood variety, common salt of the rate of, as nearly as could be calculated one ton per acre, leaving ten adjoining rows untreated. During the growing season, a difference in the foliage was readily perceptible, it being decidedly more vigorous on the salted plat. The roots, however, failed to show any marked effect from the use of the salt. The ten rows receiving no salt, yielded 126 lbs. 7 1-4 oz. of roots, while the salted plat yielded 129 lbs. 14 oz., the difference being about three per cent in favor of the salted rows.

CARROT.

Test of Varieties.

We tested in the garden the list of Carrots named in the following table. The seeds were planted April 25, in rows ten feet long and twenty-one inches apart, one hundred seeds in each row. The soil was manured as for beets, and the plants were thinned where sufficiently thick to require it. We note the time required for vegetation, per cent. of vegetation, and the number and weight of roots harvested.

CARROT.

	First vegetation in — days.	Per cent vege- tated.	Number of roots harvested.	Average weight of roots, ounces.
Danvers Orange Half-long.....	15	40	35	8
Early Short Scarlet Horn.....	22	40	37	7
Early Very Short Scarlet	22	25	20	7
English Horn or Half-long Pointed-rooted..	18	50	52	7
French Horn or Very Early Scarlet Forcing.	22	28	24	8
Gartier's Red Horn.....	18	48	42	6
Guerande	22	15	9	18
Guerande Half-long Stump-rooted	22	25	22	12
Half-long Early Carenton	22	39	29	7
Half-long Luc.....	22	33	29	9
Half-long Scarlet Nantes	22	30	26	9
Half-long Scarlet Stump-rooted	22	36	37	7
James' Intermediate.....	22	41	36	7
Large Pale-red Flanders.....	22	22	19	10
Large Short Vosges	22	29	24	10
Large Yellow Belgian.....	22	9	3	13
Long Lemon.....	22	16	15	9
Long Red St. Valery	15	73	69	6
Long Red Surrey	22	36	36	7
Long Red Without Core.....	22	17	12	6
Long Scarlet Altrincham	18	35	33	4
Orange Belgian	15	52	50	5
White Green-top.....	15	57	60	4
White Green-topped D'orthe..	15	35	30	9
White Transparent.....	22	22	16	8

The Danvers Orange Half Long (Lan.), and Danvers (Fer. 1883), seemed to be synonyms ; also Guerande (Greg.), and Guerande Half Long Stump Rooted (Vil.), and the Orange Belgian (Vil.), and Large Yellow Belgian (Sib. 1883.) The Large Short Vosges (Vil.), was wrongly named, being the white transparent. The other plantings seemed distinct, though in several of the half long varieties, roots were plentiful that would pass equally well in others.

We were favorably impressed with the Guerande carrot. The roots are half long but very large and quite regular in form. The White Green topped d'Orthe is also very productive. The French Horn or Very Early Scarlet Forcing is earliest of the varieties tested. This carrot is sold under many other names, among which are French Forcing, Early French Forcing, Early French Scarlet Forcing, Early Forcing Horn, Earliest Short Forcing Horn, Early Red Short Horn, Earliest Short Horn, Early Frame, Early Short Scarlet, Extra Early Forcing, Early Scarlet Forcing, Early French Short Horn, etc.

The experimental plantings of carrot were so much mixed through cross fertilization, as to be useless for the purposes intended.

RADISH.

Test of Varieties.

We planted one hundred seeds, from each of forty-six differently

named packages of radish seed, in the garden, April 29, in rows ten feet long and twenty-one inches apart. The soil was prepared as for the beet. We note the following statistics:

RADISH.

NAME.	First vegetation in — days.	Per cent vege- tated.	First edible ma- turity in—days.	Became hollow in — days.	First bloom in — days.	First ripe seed in — days.	Last ripe seed in — days.
Black Long Spanish Winter	10	53	64	...	70	120	
Black Round Spanish Winter	10	43	59	...	80		155
Carter's Selected Long Scarlet	10	46	49	70	63	122	155
Deep Scarlet Turnip	10	58	42	70	65	111	137
Dayton	10	66	43	...	54	98	124
Earliest Scarlet Erfurt	10	37	52	70	66	111	137
Earliest Short-topped White	10	51	52	70	72	115	155
Early Deep Scarlet Olive-shaped	10	45	42	70	68	115	137
Early Deep Scarlet Turnip	10	48	45	70	65	115	127
Early Long Scarlet Short-top	10	40	42	68	72	111	155
Early Purple Turnip	10	74	49	64	65	111	155
Early Round Dark Red	10	19	41	65	65	111	127
Early Scarlet Prussian Globe	10	28	41	64	58	110	136
Early Scarlet Turnip (Vil.)	9	82	37	69	64	110	139
Early Scarlet Turnip White Tail (Thor.)	9	31	37	48	65	110	126
Early White Giant Stuttgart	9	73	56	...	62	110	139
Early White Small Turnip	9	53	37	69	60	112	139
Garnet Turnip	9	59	37	69	51	110	126
Giant Stuttgart Summer	9	63	56	...	62	108	140
Golden Globe	9	46	46	69	52	101	121
Golden Yellow Turnip	9	61	46	69	48	97	121
Grey Round Summer	9	60	46	69	60	100	135
Grey Summer Turnip (Thor.)	10	32	41	69	58	105	126
Grey Summer Turnip (Hen.)	10	41	41	69	55	100	126
Grey Winter from Laon	10	51	53	...	74	115	136
Half long Deep Scarlet	9	48	38	62	63	101	136
Large White Summer Turnip	9	59	38	67	59	106	136
Long Purple	9	47	38	67	52	106	134
Long Scarlet Salmon	9	37	38	69	69	129	141
Long White Naples	9	76	51	69	62	109	136
Long White Vienna	10	21	41	63	63	109	136
London Particular Long Scarlet	9	28	44	...	59	115	154
Market Gardener's Early Long Scarlet	10	50	38	63	65	119	
Normandy or Marais	10	13	41	63	72	129	
Purple Large Gournay Winter	10	48	63	...	111	...	139
Purple Olive Shaped White-tipped	10	29	38	48	63	113	136
Purple Turnip	10	42	38	62	58	105	136
Purple Turnip White-tipped	9	72	38	62	58	102	126
Raphanus Caudatus	9	43	...	...	41	113	121
Scarlet China Winter	9	64	51	63	55	102	126
Scarlet Olive-shaped	9	58	38	63	63	110	136
Scarlet Olive-shaped White-tipped	9	66	38	44	65	113	136
Scarlet Turnip	9	51	38	48	67	113	136
Scarlet Turnip White-tipped	9	56	38	62	65	109	126
Small Black Summer	9	46	56	...	69	113	154
Very Large Russian Winter	9	63	110	...	...	115	
White Crooked	9	42	62	...	58	115	136
White Large Spanish Winter	9	44	58	...	55	119	139
White Olive-shaped	9	21	38	62	73	119	139
White Strassburg or White Hospital	9	34	39	69	58	106	139
White Strassburg Summer	9	52	36	69	49	110	139
White Turnip	9	41	44	69	58	110	139
Yellow Summer Turnip	9	60	41	69	59	110	126

It appears that the Early Scarlet Turnip, Early White Small Turnip and Garnet Turnip were earliest, being fit for table use in thirty-seven days. Several others, however, were noted only one day later. We think the early White Turnip retains its solidity longer than the other two, but on the other hand, it is less tender and more acrid.

As will appear, seven of the names are of winter radishes. These are not strictly comparable with the others, but as our object in growing them was to secure descriptions of the varieties, we planted the two classes together as a matter of convenience.

The *Raphanus caudatus* or Serpent radish is of interest, as the seed pods, and not the root, is the part that has been developed in cultivation. These are of about double the size of those of the common radish, and they are used as a salad like the root of the latter, or are prepared in vinegar, and used as a pickle.

Synonyms.

After a very careful scrutiny of the plants in the different rows, we pronounced the following names as synonyms.

Early Round Dark Red (Hen.), Early Deep Scarlet (Vil.), and Deep Scarlet Turnip (Thor.)

Early Scarlet Turnip (Vil.) and Early Scarlet or Red Turnip (Sib. 1883.)

Scarlet Turnip, White Tipped (Vil.), and Early Scarlet Turnip with White Tail (Thor.)

Yellow Summer Turnip (Thor.) and Golden Yellow Turnip (Vil.)

Early White Giant Stuttgart (Vil.) and Giant Stuttgart Summer (Thor.)

The plants of several of the other names have a very close resemblance, but we will not pronounce upon them until another season's trial.

Experiments.

We made several experimental plantings of radish, including green and ripe seed, seed from terminal stalk and from lower branches; first and last ripeseeds, etc. As we gathered the seeds planted from different varieties growing in proximity, the resulting plants were so far cross-fertilized as to render deductions unsafe. We note, however, one interesting fact. A plant, the seeds of which were all quite green, was pulled and hung up in the seed room to dry. A few pods were picked from it at the time it was pulled, and after drying, preserved in a separate package. The seeds from the pods dried on the plant vegetated eighty-one per cent, while those picked from the plant vegetated but three per cent, and these few vegetated plants were so feeble that they soon perished.

We made several experiments with the view of avoiding the injury from the radish fly, *Anthomyia raphani*, which has proved so injurious to the roots of radish on our soil in previous years. On May 21, we passed a small quantity of tobacco leaves through a feed

cutter, and applied the clippings thus obtained to one-half each of twenty-eight rows of radish, spreading them thinly upon the soil for a width of three inches upon each side of the rows, sprinkling on enough dirt to prevent the wind from blowing them away. The foliage in the half of the rows treated with the tobacco clippings soon became more vigorous than the other half, and we hoped to find that the roots of these plants contained fewer maggots. In this, however, we were disappointed. When the roots were sufficiently large for use, we found that those treated with the tobacco clippings contained no fewer maggots than the others. Indeed in many cases they contained more.

Growing the radish in a frame of boards had no apparent effect in keeping away the maggot, though it largely prevented the attacks of the flea-beetle.

In the spring of 1883 we applied a very liberal dressing of coal ashes upon a small plat of ground, and after forking over the soil, planted it with radish seed. The roots produced were nearly or quite as badly infested with the maggot as others grown without an application of the ashes. Last spring we again planted the plat with radish seed, and were surprised to find that the roots produced were almost entirely free from maggots. We followed the first crop with a second, and this with a third, with the same result. All the roots grown on this plat were free from the maggot. We are led to believe, therefore, that soil in which an abundance of coal ashes is thoroughly mixed will produce radishes free from the larvæ of the radish fly. We purpose carrying the experiments farther the coming season.

For details of experiments upon the flea-beetle, *Haltica striolata*, see the paragraph on insecticides.

Radishes planted late in spring, or during the summer, do not usually succeed well. We found, however, that by mulching the soil, after planting the seed, with a layer half an inch thick of grass, and watering the bed every evening when dry, until the plants were well up, a very good crop was the result.

TURNIP.

Test of Varieties.

We planted seed of fifty so-called varieties of turnip in the garden July 24, in rows ten feet long and three and one-half feet apart, one row of each variety. The plants were thinned when of proper size to about four inches apart in the row. Owing to a severe drought in August, the plants made very little growth until September.

We note the time when the varieties were fit for the table, the number of roots harvested in each, and the average weight of the roots.

Turnip.

	At edible maturity in-days.	Number of roots harvested.	Average weight per root. Ounces.
Black Long.....	86	18	2
Chirk Castle Black Stone.....	81	18	2
Carter's Stone or Stubble.....	81	12	3
Cow Horn Strap-leaf.....	86	10	3
Early Purple Top Munich.....	69	29	3
Early Red Top Auvergne Flat.....	86	13	3
Early Red Top Flat Garden.....	81	19	2
Early Red Strap-leaf.....	69	18	3
Early tone or Stubble.....	86	12	2
Early White Flat Dutch Garden.....	69	21	4
Early White Strap-leaf.....	69	24	4
Extra Early French.....	81	24	5
Early White Flat Dutch Strap-leaf....	81	18	4
Freneuse.....	86	15	3
Grey Luc.....	86	16	3
Grey Morigny.....	81	21	5
Golden Stone.....	86	11	3
Green Globe.....	86	20	2
Green Barrel.....	86	12	2
Jersey Lily.....	69	14	4
Large Green Globe.....	86	9	3
Large Red Globe	86	10	3
Large White Globe.....	86	15	4
Large White Globe Strap-leaf.....	81	12	2
Long Early White Vertus or Jersey ..	81	22	5
Long Green Tankard.....	86	9	4
Long Red Tankard (Vil.).....	81	21	6
Long Red Tankard (Till.).....	81	11	3
Long White Tankard.....	81	7	3
Long White Clairfontaine.....	86	15	3
Long White Meaux or Cow Horn....	81	14	7
Long White Vertus.....	81	15	9
Large Amber Globe.....	69	13	6
Long White Strap-leaf.....	86	10	3
Milan Purple Strap-leaf.....	81	6	4
Milan Strap-leaf.....	69	3	0
Red Top Globe Shape.....	81	21	7
Round Early White Vertus.....	69	13	6
Red Top Flat Norfolk.....	86	14	3
Snow White Olive Shape.....	81	20	6
Seven Top.....	98	13	3
White Flat or Globe.....	69	13	7
White Flat Norfolk.....	87	9	5
White Six Week's or Snow.....	87	15	5

	At edible maturity in-days.	Number of roots harvested.	Average weight of roots. Ounces.
Yellow Stone	86	10	3
Yellow Scotch or Aberdeen.....	98	10	3
Yellow Dutch.....	98	9	1
Yellow Finland	86	13	2
Yellow Flat Purple Top Montmagny..	86	23	2
Yellow Malta.....	98	7	2

Ruta Baga.

Skirving's Purple-top Yellow	99	14	25
White	99	14	30
White Purple Top.....	99	9	36
White Smooth Short-leaf.....	99	15	20
Yellow Champion.....	99	9	38
Yellow Green Top	99	9	28
*Yellow Purple Top	99	12	26

All of the plantings had vegetated on the fourth day after sowing.

The time when the turnip is fit for table use is necessarily rather indefinite. Our figures, however, will serve to show the comparative rapidity with which the different plantings developed. It appears that the Early Purple-topped Munich, Early Red Strap-leaf, Early White Flat Dutch Garden, Early White Strap-leaf, Jersey Lily, Large Amber Globe, Milan Strap-leaf, and Round Early White Vertus were all noted as being fit for table use in sixty-nine days from planting. It appears that the Milan Strap-leaf produced the largest roots, though very few of the plants survived. The Red Top Globe Shaped was most productive.

Experiments.

We made experimental plantings of turnip seed gathered at the Station in 1883, in order to compare the crop produced by the largest and smallest seeds; from ripe and unripe seeds; and from seeds of the terminal stalk, and from the lowest branches. Some of the plantings showed evidences of cross-fertilization, and therefore we regard our results as only suggestive.

In planting the larger and smaller seeds, we used those of the Early Dutch variety, sifting them in a sieve, which permitted about half to pass through. Thirty-seven roots from the larger seeds averaged very nearly seven and one-third ounces each, while forty-six roots from the smaller seeds averaged very nearly seven and a half ounces each.

In the plantings of the ripe and unripe seeds, we used the Early Dutch variety. Fifteen roots from the seeds gathered slightly

green, averaged four and a half ounces each, while thirty-four roots from fully ripe seeds averaged six ounces each.

In the trial of seeds from the terminal shoot and from the lower branches, we used three varieties, viz. : Early Dutch, Red Top, and Red Top Strap-leaf.

The results were as follows :

From Terminal Stalk.

20 roots, Early Dutch averaged.....	6.95 oz. each.
17 " Red top "	7.59 "
23 " Red Top Strap-leaf averaged.....	6.00 "
Sixty roots of the three varieties averaged 6.78 oz. each.	

From Lower Branches.

14 roots, Early Dutch averaged.....	4.93 oz. each.
16 " Red Top "	6.87 "
22 " Red Top Strap-leaf averaged	5.32 "

Fifty-two roots of the three varieties averaged 5.69 oz. each.

In this experiment, it appears that the roots grown from the seed from the terminal stalk averaged slightly more than an ounce heavier than those from the seed from the lower branches.

RUTA-BAGA.

Seeds of the seven varieties of ruta-bagas mentioned in the table were planted in the garden May 24. All had vegetated the seventh day after planting.

It appears that the Yellow Champion produced the largest roots, but that the white was most productive. A second planting of the same varieties was made June 23, which yielded very little crop.

ONION.

Test of Varieties.

We planted seeds from twenty-five differently named packages of onion seed, in the garden, April 25. A large proportion of the bulbs failed to mature in a majority of the plantings, and hence we cannot give the comparative yields. After the severe drought in August a new growth commenced, which continued in many of the varieties until they were harvested, late in October. We ascribe this failure to ripen, largely to a want of fertility in the soil. We applied a liberal dressing of stable manure during the winter of 1883-4, but were obliged to rake it off in the spring in order to permit the soil to dry in season to put in the seed. Thus we lost a part of the beneficial effects of the manure. As our garden is not yet three years old, the soil is not in proper condition for crops that require much fertility.

Eight samples only, labeled Bermuda, Early Red Flat, Early

White Round, Extra Bloomsdale, Queen, Very Early White Reine, Very Early Paris Silverskin, and a variety from Teneriffe, called "Fegina," matured their crop by the middle of September.

Experiments.

We noted last season that an experiment in growing onions on compact and loose subsoil indicated that a compact subsoil is favorable to productiveness. In order to test this experiment further, we marked off four plats, on the first of which we compacted the soil as firmly as possible by pounding it with a maul. On the second, we made the soil as loose as possible by repeated forkings; the third we prepared like the first, and the fourth like the second. We then planted six rows, each ten feet long, of Yellow Danvers onion seed, in each of the four plats, covering the seed half an inch deep with fine loam. The four plats were treated alike during the season. October 16 the bulbs were harvested, with the following result:

	Yielded, solid bulbs.	Weighing, lbs. oz.		No. of Scallions.
Plat 1, compacted subsoil.....	47	8	10	239
Plat 2, loosened subsoil.....	88	16	11	177
Plat 3, compacted subsoil.....	79	13	11	260
Plat 4, loosened subsoil.....	81	16	12	204

As will appear, the balance in this experiment is in favor of the loosened subsoil. As the crop was a failure in all of the plats, however, the result cannot be considered decisive, and we must depend upon future experiments to answer the question finally.

We made several experimental plantings with onion seed. In four cases, in which the earliest and latest ripening seed in the head were planted separately, every one gave the higher vegetation in the later-maturing seed. The varieties were Extra Early Red, Red Wethersfield, White Portugal and Yellow Danvers. The average vegetation from the earliest ripening seed was thirty-eight per cent, and that from the latest was sixty-one per cent.

The average vegetation in the twenty-five varieties was forty-eight per cent. It thus appears that the earliest ripening seed vegetated below, and the latest above the average. It would seem, from these results, that by selecting the later ripening seeds from the head, we may hope to increase the vegetative per cent of onion seed.

In two samples of green seed, one of Red Wethersfield and the other of White Portugal, the first vegetated sixty per cent, and the second sixty-one per cent, both vegetating decidedly above the average for all the plantings.

In 1883 we selected from the Egyptian or Top onion the bulblets formed at the top of the stem, the secondary bulblets which are formed on the short stems put out from the primary bulblets, gath-

ering also a small quantity of the seed that is formed on the peduncles that grow out between the bulblets. The three selections were planted in the garden April 25. The secondary bulblets produced larger bulbs at the base than the primary ones. They formed, however, no bulblets at the top of the stem. The seed from the Top onion vegetated twenty-nine per cent, and produced from 100 seeds twenty small but well-matured bulbs.

In 1888, out of several bulbs of the White Portugal onion set out for seed, a single one produced at the top of one stalk a bunch of bulblets, instead of a seed-head. We planted these bulblets, curious to see whether they would produce seeds or bulblets. They developed into enormous bulbs, bearing all the characteristics of the White Portugal onion, and ripened off very early, but showed no inclination to produce a seed-stalk.

A sample of onion seed, sent to the Station from Teneriffe, under the name "Fegina," produced very small bulbs, which matured earlier than any other variety tested. These closely resembled those of the "Queen" onion, and are possibly of this variety.

LEEK.

We planted 100 seeds, each of the following-named leeks, in the garden April 25, in the manner as noted for the onion, with the following results:

LEEK.	First vegetation in — days.	Per cent vegetated	Number of roots harvested.	Average weight of roots, ounces.
Broad Flag or London.....	19	48	37	2
Extra Large Carentan.....	19	60	45	1.3
Large Rouen.....	20	44	35	1.3
Long Large Winter.....	20	47	37	1
Monstrous Carentan.....	22	65	50	.9
Poitou Very Large Yellow....	22	43	39	.7
Rouen Very Large Winter....	22	29	20	1

The Extra Large Carentan and Monstrous Carentan showed a slight difference in the amount of foliage, as did also the Large Rouen and Rouen Very Large Winter. Whether this difference is due to a difference in variety, or from some other cause, we have no means of knowing. With the exception of the Poitou Very Large Yellow, in which the foliage was a shade paler than in the others, the plants grown under the different names showed a very close resemblance.

MELON.

We were more successful with the melon the past season than in 1883, though as will appear from the table we failed to secure a ripe fruit from several varieties. We are compelled to do injustice in some cases, for some of the plantings that failed to ripen a fruit would doubtless have done so, but for pilferings that could not be

avoided. The list of names of varieties planted, and the statistics noted are as follows :

MELON MUSK.

MUSK MELON.	First vegetation in -- days.	First bloom in -- days.	First ripe fruit in -- days.
Allen's Superb.....	10	46	....
Boston Pet	10	48	123
Cassaba or Long Persian.....	10	46	....
California Yellow Fleshed Citron.	9	44	105
Chicago Nutmeg.....	10	41	....
Early White Japan.....	10	41	....
Extra Early Citron.....	10	38	95
Early Nutmeg.....	10	44	126
Green Nutmeg.....	10	39	....
Golden Perfection.....	9	51	124
Green Persian.....	10	43	....
Hackensack.....	10	41	100
Improved Christiana.....	10	51	126
Jenny Lind.....	9	38	99
Jenny Lind Citron.....	10	44	105
Long Persian.....	9	39	120
Long Yellow.....	10	41	97
Lanzarote.....	9	71	...
Large Boston Nutmeg.....	10	46	97
Montreal Market.....	10	41	100
New Surprise.....	10	43	126
Netted Nutmeg.....	9	38	125
Oblong Netted.....	9	38	109
Pine Apple (Thor.).....	13	48	115
Pine Apple (Fer.).....	9	40	114
Passy Canteloupe.....	10	44	105
Prolific Nutmeg.....	10	39	...
Round Yellow Canteloupe.....	13	62	121
Red Fleshed Cavaillon.....	9	72	...
Shaw's Golden Superb.....	13	43	100
Surprise.....	13	48	121
Ward's Nectar.....	10	41	123
White Japanese.....	10	41	100

MUSK SCENTED MELON.

Pomegranate (Thor.).....	10	49	111
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WATER MELON.

Black Seeded.....	10	47	114
Dark Icing or Ice Rind.....	12	70	110
Ice Cream.....	22	81
Landreth's Boss.....	22	71	....
Mountain Sweet.....	22	78	....
Red Seeded.....	21	72	....
Reedland.....	11	71	110
Seikon	11	70	108

It appears that the Extra Early Citron was earliest, giving its first ripe fruit in ninety-five days. Three other varieties, viz., Long Yellow, Large Boston Nutmeg and Jenny Lind ripened one or more fruits in less than one hundred days.

The water melon seems less suited to our soil than the musk melon. The earliest to ripen a fruit was the "Siekon," a variety of which the seeds were received from Messrs. Vilmorin, Andrieux & Co. of Paris.

Synonyms.

The musk melons planted under the names "Jenny Lind" (Sib. 1883) and "Jenny Lind Citron" (Lan.), were evidently the same variety; also those planted as "Surprise" (Sib. 1883) and "New Surprise" (? 1882). The Chicago Nutmeg and Prolific Nutmeg had a very striking resemblance, as did also the Early Nutmeg and Boston Large Nutmeg. Our evidence, however, is not as yet sufficient to warrant us in pronouncing these as synonyms.

Experiments in Pinching back Melon Vines.

It has frequently been stated that the earliness and productiveness of melons is promoted by pinching off the ends of the stems soon after they commence to run. It is claimed that the pinching back stimulates the growth of branches on which the female flowers are chiefly borne.

With the view of attesting the truth of these statements, we selected two rows of Christiana melons, each seventy-five feet long. In one of these rows, commencing July 18, we pinched off the end of every runner as soon as it had attained the length of one and a half to two feet. In the other row we permitted the runners to grow to their full length. The results showed that pinching the stems much increased the number of branches, and hence of the female flowers. We noted that female flowers very rarely appear on the main stem, and on the other hand, the first flower on a branch is almost invariably female. The second flower on the branch is sometimes male and sometimes female. Beyond the second, the flowers are, as on the main stem, almost always male. On August 5, we counted the flowers on fifty main stems and found but four female to 312 male flowers.

Our first impressions were that the fruits formed on the pinched row were more numerous and earlier than on the unpinched row. On August 15, however, we counted on the pinched row ninety-seven fruits exceeding three inches in diameter, while on the unpinched row we counted eighty-five of the same size, thus showing that the difference in the two rows was very slight.

The first fruit ripened on the unpinched row August 26, one day earlier than that on the pinched row. No perceptible difference appeared at this time in the productiveness of the two rows.

It appears, therefore, from this experiment with the melon that the advantage to be gained by pinching the stems is theoretical rather than real. The number of fruits formed seems to bear little relation to the number of female flowers.

It would seem, however, that in the case of the cucumber, when grown for pickles, the productiveness might be very largely increased by pinching the runners, for we know that in this plant the fruits continue to form, limited only by frost, so long as none are permitted to ripen. We purpose repeating this experiment the coming season with the cucumber.

We note here that in the squash, pumpkin and water melon the female flower is not usually produced on the branch as in the melon and cucumber. It almost always appears at the axil of a branch, though branches often form without a flower. As in the melon and cucumber, the flowers on the main stem (except when at the axil of a branch) are almost invariably male, as are those on the branches beyond the axillary flower.

Squash.

We grew the following list of squashes, planting the seeds May 26 in the manner noted for the melon :

SQUASH.			
	First vegetation in — days.	First bloom in — days.	First ripe fruit in — days.
American Turban.....	10	58	68
Boston Marrow.....	11	56	85
Brazilian Sugar.....	22	73	98
Early Bush.....	10	45	59
Early Neapolitan.....	10	64	109
Golden Bush.....	10	46	72
Hubbard.....	10	56	67
Italian Green-striped.....	10	54	71
Landreth's White Turban.....	11	71	93
Long Neapolitan.....	11	71	...
New White Pine Apple.....	10	49	85
Olive.....	11	..	...
Patagonia.....	21	..	...
Perfect Gem.....	12	73	112
Small China Turban.....	11	70	85
Summer Crookneck.....	10	44	66
Valparaiso.....	10	78	95
Warted Marrow.....	10	72	108
Yellow Bubango or Summer.....	14	78	...

The time of ripening in the squash is difficult to determine. The time noted is based upon our impressions formed on a very frequent examination of the fruits.

The variety called Landreth's White Turban (Lan.) proved to be the same as the New White Pine Apple (B. M. & Co.) All of the other plantings seemed to be clearly distinct. Seeds under the name of Yellow Bubango, or Summer, were sent to us for trial from Teneriffe. The variety proved too late to be of value in this climate. We will add, that none of the varieties tested appeared to possess any advantages over the better known varieties. The New White Pine Apple is a summer squash, resembling in quality the Golden Bush. The Small China Turban is of very good quality, but the flesh is quite thin, and we have doubt about its keeping qualities. We have noticed nothing striking in any of the other varieties not previously tested.

We would recommend the Early Bush for summer use, the American Turban, Boston Marrow, Hubbard and Perfect Gem for autumn and winter. The latter is desirable on account of its hardiness, productiveness and long-keeping qualities. For account of our experiments upon the Squash Vine borer and other insects that infest the cucurbitaceous plants, see the article on Insecticides.

CUCUMBER.

Test of Varieties. — We planted seeds from twenty-four differently named packages of cucumber, in the garden May 26, in drills ten feet long, sowing the seeds thickly, one or two to the inch. The drills were previously prepared by opening a slight furrow, filling this with well-rotted manure and covering the latter with about three inches of fine soil. We note the time of vegetation, blooming, when of pickle size, when fit for table use, and when ripe, as follows:

	First vegetation in — days.	First bloom in days.	Pickle size in days.	Table size in days.	First ripe fruit in days.
Bismarck.....	9	45	70	70	95
Early Yellow Dutch.....	9	50	65	73	95
Fejina.....	9	79	..	122	..
Grecian or Athens.....	9	45	70	70	95
Green Long China.....	9	44	68	70	93
Green Long Gladiator	9	47	74	77	93
Landreth's White Slicing...:.....	9	57	70	75	86
Large White Bonneuil.....	11	57	66	70	89
Long Green Bedford.....	9	66	..	86	127
Long Green Common.....	9	47	66	70	100
Long Green Smooth from Athens..	8	57	67	70	85
Long Green Turkey.....	8	45	61	66	85
Munroe's Very Long Green.....	8	49	61	66	87
Netted Russian.....	8	40	59	63	67

	First vegetation in — days.	First bloom in — days.	Pickle size in — days.	Table size in — days.	First ripe fruit in — days.
Peerless.....	9	47	67	67	86
Peerless White Spine.....	10	66	71	71	..
Rabley.....	10	71	..	95	..
Rollison's Telegraph.....	10	66	71	77	101
Russian Small, Early.....	9	45	59	67	78
Small Green Pickling or Gherkin..	9	49	67	70	86
Snake	9	52	75	80	108
Very Long Green English Prickly.	9	55	66	70	86
West India Gherkin...	22	66	82	86	127
White Early	9	49	70	70	89

It appears that the Netted Russian was earliest in every particular. This variety is also sold under the names Russian Netted, Brown Netted, Khiva Cucumber, etc. The fruit is oval in form, and of small size, being about five inches long, and three inches in diameter when fully developed. The skin at maturity is dark russet brown, covered with a dense white net-work, by which characters it is very readily distinguished from most other varieties. We would not recommend it as the only variety to grow, as it is less productive than the later sorts, and maturing so early, it would probably not continue to produce well throughout the season. The Peerless (Thor.) and Peerless White Spine (Greg.), which to all appearances are identical as grown by us, would doubtless prove more profitable as a market variety, and perhaps more desirable for family use, except for the earliest crop.

The varieties called Green Long Gladiator, Long Green Bedford, Rabley, and Rollison's Telegraph, belong to the class known in England as "ridge" cucumbers. These we believe are intermediate between the garden varieties and those known strictly as "frame cucumbers." The latter mature only under glass. It will be observed that with the exception of the Rabley, all of these matured fruits in our garden the past season.

The Small Green Pickling or Gherkin (Vil.), and the West India Gherkin (Vil.), were identical as grown by us, though the seeds of both came from the same source. A cucumber very closely resembling the Boston Pickling variety is sometimes sold under the name Gherkin. The Gherkin is not used for slicing on the table, but only for pickles for which use the fruit is picked when about half grown, or when the skin may be easily broken by the finger nail.

The Snake cucumber is more curious than useful, though it is sometimes used for pickling. Though invariably called a cucumber, it is botanically more nearly allied to the melon.

The Fejina, of which the seeds were sent to us from Teneriffe, proved latest of all — so late that we learned little of its qualities.

For observations concerning the insects that injure cucumber plants, see the article on Insecticides.

CABBAGE.

Test of Varieties.

We grew fifty-two so-called varieties of cabbage, and twelve of Savoy, making two plantings of the entire list, one rather early, and the other late.

The soil was fertilized before plowing with a liberal dressing of barn-yard manure, and just before setting the plants, with a moderate application of super-phosphate. Our soil is not yet in a sufficiently high state of cultivation to produce the finest cabbages, but our tests may not prove less valuable on this account.

For the early planting, we planted the seeds in boxes in the hot-bed, March 24 and 25, transplanting eleven plants of each name to the garden, May 2. The later planting was made about May 25, and a few plants of each transplanted to the garden June 25.

Owing to the liability to mistakes, we usually think it best not to reset the plants that fail to grow after transplanting. We therefore note in the table in each planting, the number of plants that survived.

The statistics noted in the two plantings are as follows:

CABBAGE.

NAME.	EARLY PLANTING						LATE PLANTING.					
	First vegetation in - days.	Per cent vege- tated.	Number of plants survived	First head formed in - days.	No heads formed.	Average diameter of heads—Inches.	Per cent vege- tated.	First vegetation in - days.	No heads formed.	Average diameter of heads—Inches.	Per cent vege- tated.	First vegetation in - days.
Bacalan Early	5	92	7	127	5	6%	78	9	6%	5%	78	9
Bacalan Late	5	92	7	131	8	6%	82	8	6%	6%	82	8
Bloomdale Brunswick	7	70	6	123	8	6	80	7	7	6	80	7
Bloomdale Bullock Heart	7	67	9	141	8	6	74	9	9	6	74	9
Bloomdale Early Dwarf Flat Dutch	5	76	9	136	7	7%	76	13	13	6	76	13
Bloomdale Early Market	5	75	8	122	8	6%	80	11	109	9	6%	11
Bloomdale Late Flat Dutch	7	89	9	133	9	6%	80	12	108	11	6%	12
Berkshire Beauty	5	85	9	140	8	5%	88	12	121	6	7%	12
Chou de Fumel	5	85	6	117	1	5%	96	20	185	9	5%	20
Dark Red Dutch	5	70	7	127	7	4%	84	12	122	8	5	12
Dax	5	72	6	147	4	5	88	16	144	1	6%	16
Drumhead Early Dutch	7	72	6	117	8	6	76	14	116	11	6%	14
Early Cone	7	56	8	129	8	5%	76	15	116	11	6%	15
Early Dark Red Erfurt	7	95	9	181	9	4%	96	19	100	16	4%	19
Early Deep Head	4	86	9	139	9	4%	84	17	116	11	7%	17
Early Oxheart	6	58	9	123	8	4%	80	18	109	11	5%	18
Early Paris	6	79	9	128	8	5%	80	10	109	5	6	10
Early Winnigstadt	5	100	8	123	7	5%	88	13	117	9	5%	13
Early York	5	53	11	123	11	4	98	17	122	12	4%	17
Excelsior Late Flat Dutch	7	94	8	143	6	4%	96	17	122	11	6%	17
Fowler's Early Drumhead	6	76	10	184	10	5	00	9	107	4	7%	9
Green Glazed American	5	83	8	139	4	4	00	6	...	...	...	6
Habas Drumhead	5	96	7	139	4	4	92	17	144	4	6%	17
Henderson's Premier	6	78	9	126	9	4	00	16	109	13	5	16
Ingreville	7	78	4	137	6	4	96	13	185	4	6%	13
Long Island Medium Flat Dutch	7	28	10	140	10	5	48	3	116	1	9	3
Landreth's Earliest	5	75	10	163	10	5	00	17	107	9	5%	17
Landreth's Large Late Mountain	7	67	10	148	9	4	44	9	116	4	5%	9
Low's Early Peerless (Till.)	5	89	9	126	9	6	96	17	116	13	6	17
Low's Early Peerless (Greg.)	6	78	9	133	8	4	96	12	107	5	6%	12
Large Brunswick Short Stemmed	7	94	6	136	6	4	96	12	116	11	6%	12
Large Late Flat Brunswick	7	93	10	136	8	5	84	12	109	9	6	12
Large Oxheart	5	90	8	135	8	5	100	10	121	5	8	10
Large Red Drumhead	7	82	10	136	10	4%	100	13	122	7	5%	13
Large York	7	86	9	133	9	4%	88	12	122	8	5%	12
Late Flat Dutch	6	87	7	126	7	5%	100	12	108	10	6%	12
Late American Drumhead	4	87	10	143	8	5	100	15	122	10	6%	15
Landreth's Early Summer Flat Head	7	77	10	126	10	4%	92	14	107	11	5%	14
Marbled Burgundy	7	88	9	128	9	4%	92	17	116	14	6%	17
Mason's Drumhead	7	83	8	144	6	4%	100	8	120	6	6	8
New Garfield Pickler	7	91	10	156	6	2%	84	8	122	2	4%	8
Paris Market, very early	5	72	10	123	10	4%	52	6	107	2	7	6
Pomerian Pointed Head	7	62	7	136	5	4%	74	8	122	5	5%	8
Schweinfurt Quintal	7	95	10	137	8	6%	92	7	116	7	7%	7
St. Dennis' Large Drumhead	7	67	11	139	10	4%	84	8	116	6	6	8
St. John's Day Early Drumhead	6	89	8	116	8	4%	84	9	107	8	5	9
St. John's Day Late Drumhead	6	88	10	139	9	4%	100	9	116	7	5%	9
Sugar Loaf	5	86	10	142	10	3%	92	9	122	5	5%	9
Tourlaville	6	84	9	132	9	4	90	4	122	2	4	4
True Early Jersey Wakefield	6	86	10	135	10	4%	92	4	116	2	6%	4
Vaugirard's Winter Drumhead	6	80	10	129	10	4%	84	7	116	4	5%	7
Very Early Stampes	6	80	8	130	8	4%	82	9	116	6	5	9
- Savoy -												
Dwarf Early	6	90	10	139	4	3%	82	6	144	5	5	6
Golden	6	94	8	205	2	2%	100	8	...	5	5	8
Green Globe	6	88	11	205	2	2%	96	9	...	1	4	9
Large Vertus Drumhead	6	88	8	182	5	5%	92	9	144	8	4	9
Late Hardy Winter Drumhead	6	91	10	199	3	3	100	9	144	8	5%	9
Long Headed	4	93	11	205	4	2%	88	10	...	1	4	10
Norwegian	4	90	10	142	7	3%	100	7	...	2	5	7
Small Early Elm	4	90	11	140	4	3	100	11	122	6	4%	11
Small Fine Curled Limay	6	81	9	200	1	3	100	10	...	4	...	10
Tours	4	82	9	200	1	3	86	10	...	4	2%	10
Very Early Paris	4	93	10	118	9	4	84	10	116	5	5%	10
Victoria, Very Curled	4	88	9	205	3	2%	72	10	...	...	...	10

In our remarks upon the table, we shall treat the Smooth Leaved Cabbages and the Savoys separately. In the former class we note that the percentage of plants that formed heads was largest in the early planting, but that the diameter of the heads was greatest in the late planting. Thus, by adding the whole number of plants that survived, and the whole number of heads formed in each of the two plantings, we find that ninety-one per cent of the plants formed heads in the early, and sixty-two per cent formed heads in the late planting. On the other hand, the average diameter of the heads in the early planting was 4.94 inches, and in the late planting it was 5.95 inches.

Comparing the order of earliness of the varieties in the two plantings we find a great lack of uniformity. As an example, we will compare the earliest ten varieties of the early planting, placing the names in the order that they formed the first firm head of merchantable size, with the same varieties in the second planting.

The number in the left hand column indicates the order of earliness in the early planting, the same number being given to the varieties that were noted on the same day. The number at the right hand indicates the order of heading of the variety in the late planting.

	EARLY PLANTING.		LATE PLANTING.	
	First head formed in — days.	Order of ear liness	First head formed in — days.	Order of ear liness.
St. John's Day Early Drumhead..	116	1	107	2
Bacalan Early.....	117	2	131	10
Chou de Fumel.....	117	2	135	11
Drumhead Early Dutch.....	117	2	116	5
Paris Market, Very Early.....	123	3	107	2
Henderson's Premier.....	126	4	109	3
Low's Early Peerless (Till.).....	126	4	116	5
Late Flat Dutch.....	126	4	113	1
Landreth's Early Summer Flathead.	126	4	107	2
Early Paris.....	128	5	109	3

It thus appears that no relation seems to exist in the order of maturity of the two plantings. We note a similar lack of uniformity in comparing the order of maturity of different varieties of the tomato in 1883 and 1884. Discrepancies of this kind suggest how little we know concerning the factors that influence plant growth.

As the number of plants grown of the different varieties is so small, we are warranted in drawing no conclusions as to their heading qualities.

SAVOYS.

As appears from the table, the Savoy cabbages did not succeed well. Among the best were the Very Early Paris, Large Vertus

Drumhead, and Norwegian. The table qualities of the Savoy are decidedly superior to those of the common, or smooth-leaved cabbage.

Experiments.

In 1883 we selected samples of seed from the various parts of a plant of the Winnigstadt variety, set out for the purpose of producing seed, and also picked a quantity of unripe pods from different parts of the same plant. On March 25, we planted four samples of seed as follows: Seeds from the terminal pod, seeds from terminal stalk, seeds from the lower branches, and seeds gathered green. On May 5, we transplanted eleven plants of each sample to the garden. We were interested to note that every plant that survived of the four selections, forty-one in all, formed a good head. No difference was noticeable in the plants from the different selections of seed, with the exceptions of those from the pods gathered slightly green. This seed vegetated best of the four samples, and the heads formed earlier and were decidedly larger than those from any of the other samples of seed. The first head from the green seed was of merchantable size on July 29, or 126 days from planting, while from the other sample of seed the first heads were formed August 3 to 6, or 131 to 134 days from planting. The average diameter of the heads from the green seed was six and one-half inches, while that from the other samples of seed was four and three-fourths inches. It seems hardly possible that this difference in favor of the green seed can be entirely due to accident.

We have made preparations for repeating this experiment on a more extended scale next season.

Experiment with Fertilizers.

It has been claimed that sulphate of iron (copperas) used in connection with other fertilizers, possesses an especial merit as a fertilizer for plants that develop a large amount of foliage.

In order to test this substance as a fertilizer for cabbage, we marked off three small plats in the garden, each of which contained 245 square feet, or about $\frac{1}{8}$ of an acre. The soil had already received a moderate application of stable manure.

We will designate the plats as A, B and C, respectively. On May 31, we set out the three plats to cabbages, using the Landreth's Large Late Mountain variety. Each plat contained thirty-six plants. On June 19, we applied to plat A sulphate of iron in solution at the rate of (as nearly as could be calculated) 200 pounds per acre. To plat B we applied the same amount of sulphate of iron in solution, and in addition, superphosphate at the rate of (as nearly as could be calculated) 1,000 pounds per acre. To plat C we applied superphosphate alone at the same rate as in plat B.

On September 14, we harvested the crop, the earlier heads at this time being about to burst. On plat A, thirty-four plants survived,

of which twenty-eight formed heads of merchantable size. On plat B, twenty-five plants survived, of which twenty-four formed heads of merchantable size. On plat C, twenty-nine plants survived, of which twenty-eight formed heads of merchantable size. We note the average weight in ounces of the heads in the different plats, with their average diameter, as follows:

	Av. weight.	Av. diameter.
Plat A, 28 heads.....	42.64 oz.	6.36 inches.
do. B, 24 do.....	46.04 oz.	6.00 do.
do. C, 28 do.....	48.96 oz.	6.41 do.

While we cannot regard a single experiment as in any sense conclusive, the indications in this case are that the sulphate of iron applied proved detrimental. The number of plants that headed, and the solidity and weight of the heads were least in plat A, which received only the sulphate of iron, and most in plat C, which received the superphosphate, while in plat B, which received both fertilizers, the average weight of the heads was intermediate.

GROWING THE CABBAGE FROM SLIPS.

Were it possible to readily propagate the cabbage from sections of the leaf, as florists propagate the Begonia, there would be many advantages in the method. We should be able to avoid, in a great degree, the variations caused by cross-fertilization or reversion, which so often injure the progeny of our best varieties. The market gardener could propagate his plants from his finest heads, and be reasonably sure of securing equally good heads, while varieties might be expected to come as true to name, as do those of the apple or geranium.

During the past two seasons we have been experimenting in this direction. We have succeeded in growing several plants, and in one instance a fine head of cabbage, by slipping a section of a leaf from a cabbage head, in the propagating bed. We have thus demonstrated the possibility of this method of propagation. Thus far, however, so great a length of time has intervened between the rooting of the slip and the formation of the bud, as to render the method impracticable for economic purposes. Whether we shall be able to shorten this time by selecting the plants that start soonest, through a number of generations, is the important question.

For a record of our experiments upon the cabbage caterpillar, see the article upon insecticides.

CAULIFLOWER.

We grew the following twenty so-called varieties of cauliflower, on soil prepared as described for the cabbage. The seeds were planted March 5 and 6 in boxes in the green-house, and eleven plants of each name transplanted to the garden May 2. We noted the statistics given in the table.

CAULIFLOWER.

	First vegetation in—days.	Per cent vege- tated.	First head formed in —days.	No. of plants sur- vived.	No. of heads formed.
Dwarf Erfurt.....	6	78	182	4	4
Early Dutch, or Early London.....	6	72	180	5	4
Early Dwarf Surprise.....	6	23	175	6	6
Eclipse.....	7	60	162	7	6
Half-early Large White French.....	7	93	190	9	6
Half-early Paris	6	93	197	8	7
Imperial	6	86	160	8	8
Lackawanna	6	86	150	9	8
Large Algiers.....	5	85	189	6	3
Large Late Asiatic	5	90	156	4	4
Large Late Stadtholder.....	6	68	...	8	3
Late Giant Italian	5	99	154	8	8
Late Paris.....	6	82	170	4	3
Le Normand's Extra Large	7	54	149	7	6
Le Normand's Short-stemmed.....	5	73	161	8	6
Paris Extra Early	5	84	154	6	6
Sea Foam	5	75	182	3	2
Veitche's Autumn Giant.....	5	74	182	6	3
Very Dwarf Alleaume.....	5	52	189	8	6
Walcheren.....	5	94	182	6	4

Owing to the severe drought that followed the transplanting and to the ravages of the cabbage-fly, many of the plants failed to survive. Of those that survived, however, a very fair proportion formed heads, as appears from the table.

The LeNormand's Extra Large was earliest, forming its first head in 149 days. The Lackawanna was second, forming a head in 150 days. It appears from the table that some of the varieties called "late" formed heads earlier than others called "early." In our test there was not much difference in the average size of the heads from the different varieties. None of the heads formed were of extra large size.

Brocoli.

We grew plants of ten so-called varieties of brocoli, but strange to say, only one, the Purple Cape, formed a head. Of this, however, every plant headed.

We also attempted to grow the Chinese cabbages Pak-choi, and Pe-Tsai. The seed vegetated well, but the plants made very little growth after being transplanted. They were much harassed by the flea-beetle, and quickly ran to seed.

LETTUCE.

Test of Varieties.

Our list of lettuce includes one hundred and thirty-three names. We planted the seeds April 30 on soil prepared as noted for the

onion, in rows ten feet long and twenty-one inches apart; two rows of each sample (with a few exceptions).

We condense our notes in tabular form as follows:

LETTUCE.

NAME.	First vegetation in—days.	First edible ma- turity in—days.	Days fit for table use.	Commenced to form head in —days.	Commenced to form flower stalk in—days.	First bloom in— days.	Last ripe seed in —days.
All the Year Round (black seed)	13	50	32	55	82	112	168
All the Year Round (white seed)	13	48	30	55	78	98	160
American Curled	9	48	32	....	80	122	160
Balloon Cos	9	47	42	....	82	118	168
Bath Cos (black seed)	14	57	32	....	82	119	160
Bath Cos (white seed)	9	50	33	....	88	108	160
Black Seeded Butter	10	48	30	61	78	113	160
Bloomsdale Butter (black seed)	14	51	27	61	78	112	160
Bloomsdale Early Summer	9	49	38	55	82	112	168
Bloomsdale Reliable Cabbage	10	48	34	55	82	108	159
Bossia	10	49	36	..	84	112	168
Boston Market	12	48	13	55	61	77	109
Brown Batavian (white seed)	9	57	28	....	83	111	160
Brown Dutch (black seed)	15	57	22	....	79	100	153
Brown Dutch (white seed)	13	57	26	....	83	112	160
Brown Genoa or Palatine	9	57	21	....	78	96	106
Brown Winter (white seed)	15	57	2	....	59	80	106
Blonde de Berlin-yellow	9	50	23	57	73	92	148
Blood Red Small	10	50	29	60	79	101	153
Bruine Geel	9	51	12	61	63	83	121
Bunney's Incomparable Green Cos....	9	54	30	....	83	114	154
California Curled	9	59	30	....	89	....	....
Common Green Cutting	9	47	37	....	54	69	109
Crisped Small Early (black seed)	9	57	5	....	62	82	113
Crisped Small Early Cutting	9	57	....	54	57	78	109
Crisped Small Early Frame	9	54	1	....	55	78	109
Curled Cutting	9	57	4	....	61	72	109
Curled German Batavian	9	54	29	....	83	109	150
Commodore Nut	9	52	23	57	75	96	159
Dwarf Green Early (black seed)	10	54	19	54	73	93	150
Dippe's Emperor, New	10	58	2	51	58	82	128
Early Durham	9	54	28	55	82	97	153
Early Curled Simpson	9	52	26	....	82	....	....
Early Dwarf Brown Forcing	9	58	4	59	62	84	128
Fine Early White Spring	10	62	....	55	62	84	118
George's	10	54	9	55	63	84	109
Green Dutch	10	57	32	....	89	....	....
Green Fat	9	57	27	....	84	113	....
Green Paris Cos	9	47	35	....	82	105	148
Green Royal Winter	9	47	28	....	75	93	160
Green Tennis Ball	9	45	11	....	56	76	109
Green Winter Cos	10	48	14	....	62	91	121
Grey Paris	9	47	36	....	83	114	166
Ground Cos	9	50	11	....	61	79	117
Golden Spotted	9	58	24	66	82	112	154
Green Winter of Naples	10	51	10	55	61	82	121
Grise	12	51	26	66	77	96	149
Hardy Green Winter or Hammersmith	9	50	11	57	61	79	115
Hardy Red Winter	9	48	13	55	61	83	107
Hardy's Northern King	12	50	29	....	79	107	152
Imperial	9	48	11	....	59	124	....
Improved Spotted Cos (black seed)	9	45	37	....	82	....	....
Improved Spotted Cos (white seed)	9	45	36	....	78	107	160
Landreth's Forcing	9	45	32	49	77	118	160
Landreth's Heat Resisting Cos	9	48	25	....	73	96	148
Large Green	9	45	28	59	73	94	129
Large Green Pas-de-Calais	9	45	28	60	73	96	153
Large Versailles	9	45	31	52	76	105	148
Large White Summer Cabbage	9	45	16	54	61	82	129
Large White Stone Summer	9	45	44	57	89	112	160
Large White Winter	9	50	19	....	69	85	129
Large Yellow Seeded Normandy	9	51	25	....	76	96	148

LETTUCE — (Continued).

NAME.	First vegetation in — days.	First edible ma- turity in — days.	Days fit for table use.	Commenced to form head in — days.	Commenced to form flower stalk in — days.	First bloom in — days.	Last ripe seed in — days.
Le Boeuf	9	45	31	....	76	101	153
Large St. Angelo.	10	49	29	....	78	112	160
Large Yellow Cyrinus.	12	49	28	....	75	104	152
Madeira or Large Winter (white seed) .	9	50	39	54	59	82	121
Magnum Bonum or Florence Cos (black seed)	9	51	32	....	83	109	160
Magnum Bonum or Florence Cos (white seed)	10	48	44	....	93	120	160
Malta Drum head	9	45	26	57	71	93	148
Marvel or Red Beson	9	50	33	....	83	113	160
Monstrous Brown Cos.	9	50	32	....	82	96	150
Mortatella.	9	47	14	54	61	84	117
Maddaloni.	9	49	30	....	79	118	152
Mallard or Negro Head	9	45	30	....	75	97	153
Munson's Perfection	10	48	36	....	84	121	160
Neapolitan	10	45	28	54	78	101	153
New Giant of Salerno.	10	48	35	..	83	118	160
Pelletier.	10	51	28	....	79	104	156
Red Cos.	10	45	32	....	83	104	153
Red Edged or Victoria	9	47	14	52	61	83	129
Red Winter Cabbage.	9	45	14	54	51	82	121
Red Winter Cos.	9	45	32	..	77	104	150
Roquette	23	63	19	71	82	109	158
Royal or White Summer.	10	48	29	55	77	97	160
Speckled Dutch Butter Head Early Cabbage	9	45	16	52	61	83	166
Spotted Cos (white seed)	9	45	32	..	77	96	148
Stone Head Golden Yellow.	9	45	17	49	62	93	148
Stone Tennis Ball or Tom Thumb	9	45	24	52	69	96	148
Silver Ball, New Winter	10	51	18	59	69	89	118
Silver Heat of Haarlem	23	..	....	....	....	....	....
Trocadero.	9	48	31	60	79	111	148
Turkish or Butter.	9	50	26	....	76	106	159
Texer.	12	51	22	55	73	94	152
Verly Early Dwarf Green.	9	49	17	57	66	90	134
Very Large Yellow Paresseuse	17	49	37	61	86	115	166
White Batavian or Silesian	9	48	31	....	79	116	148
White Boulogne	9	45	9	52	54	74	109
White Chavigny	9	48	42	66	90	120	166
White Paris Cos.	9	50	34	....	84	108	166
White Tennis Ball	9	50	5	51	55	75	148
White Berlin Summer	9	50	27	....	77	94	153
White Nonpareil.	9	49	17	....	66	86	153
White Simpson	9	49	26	....	75	97	153

It appears that sixteen varieties were fit for table use in forty-five days from planting, and that none were called of suitable size earlier than this. These were Green Tennis Ball, Improved Spotted Cos (Black Seed), Improved Spotted Cos (White Seed), Landreth's Forcing, Large White Summer Cabbage, Large White Stone Summer, LeBoeuf, Malta Drumhead, Neapolitan, Red Winter Cabbage, Red Winter Cos, Speckled Dutch Butterhead, Spotted Cos (White Seed), Stone Head Golden Yellow, Stone Tennis Ball or Tom Thumb, and White Boulogne. It appears also that the Large White Stone Summer remained longest fit for table use, that is, it was latest in forming the seed stalk. This is also one of the very best

heading lettuces that we have tested, heads sometimes forming five inches in diameter. It seems identical with the Very Large Yellow Paressense, and also the lettuce we grew in 1882 and in 1883 under the the name White Cabbage.

It is evident that the varieties that earliest acquire sufficient size for use do not necessarily form the seed stalk earliest.

Among the newer varieties tested, we note three as being of peculiar interest, viz., the Pelletier, Golden Spotted and Roquette.

The Pelletier (French synonym, *Laitue Beauregard*) is very distinct in appearance through its deeply cut foliage, of which the edges of the pointed lobes, folding together below, cause the extremities to point upwards. It forms a small but compact head, but early becomes tough and bitter.

The Golden Spotted is interesting from its color, which is a beautiful mingling of brownish red and yellowish green. It forms a head two to three inches in diameter and the leaves are very mild and tender. As appears from the table, it was not early, but was among the very latest in forming the flower stalk.

The Roquette lettuce is so distinct as to almost suggest a different botanical species from the other lettuces. The plant when full grown is only six inches in diameter, but forms a remarkably solid little head about two inches in diameter, and three inches long. The leaves are intense clear green, and very mild in flavor, but a little tough. It is not a desirable variety for growing in frames, as its small size might indicate, as it is very late.

Of the varieties tested, we would recommend for frame culture, Crisp Small Early Frame, Green Tennis Ball, Stone Tennis Ball or Tom Thumb, and Landreth's Forcing; and for open air culture, Large White Stone Summer, All the Year Round (Black Seed) White Chavigny, and Golden Spotted. Of Cos lettuces, the White and Green Paris are perhaps as good as any. For ornamental lettuces the Marvel or Red Beson, American Curled, Pelletier, and Golden Spotted are perhaps the finest varieties tested. The first is deep carmine red, the second two are green, but are very attractive from their beautifully fringed borders.

We think a very fine ribbon bed for early spring might be formed by using alternate rows of these four varieties.

Synonyms.

Among so many names of lettuce as we tested the past season, it would be very strange if the plants of many did not closely resemble each other in appearance. We were surprised, however, to note that a large proportion of them are clearly distinct. A few appear to be synonyms, as grown by us, while several others have a very close resemblance. We give a list of those names of which the identity seems well nigh certain, appending also the names of any that we decided to be synonyms of the same variety in 1883:

All the Year Round, Black Seed (Vil.), and White Berlin Sun-

mer (Sib. 1883), also from report of 1883, Satisfaction Black Seeded (Sib. 1883), and Salamander (Hen. 1883).

American Curled (Vil.), Prize Head (Sib. 1883), American Gathering (Sib. 1883), and Ferry's Early Prize Head (Ferry 1883).

Black Seeded Butter (Hen.), and Bloomsdale Butter, Black Seeded (Lan.).

Dwarf Green Early, Black Seeded (Greg.), and Very Early Dwarf Green (Vil.).

Early Curled Simpson (Vil.), and Munson's Perfection (Sib.).

Green Paris Cos (Vil.), and Landreth's Heat Resisting Cos (Lan.).

Hardy Red Winter (Vil.), and Red Winter Cabbage (Thor.).

Neapolitan (Vil.), Large Saint Angelo (Dam.), and New Giant of Salerno (Dam.).

Very Large Yellow Paresseuse (Dam.), and Large White Stone Summer (Vil.), also from report for 1883, White Cabbage (D. Batchelor, 1882).

In a few cases lettuce described as distinct by Messrs. Vilmorin, Andrieux & Co., showed no difference as grown by us. Thus the samples labeled Large Green (Vil.) and Large Green Pas-de-Calais (Vil.), seemed the same, also the Crisp Small Early Cutting (Vil.) and Crisp Small Early Frame (Vil.). A change of climate may have obliterated the slight variety differences.

The sample labeled Improved Spotted, White Seed (Vil.) was evidently a mistake, as the plants produced were unquestionably identical with those of Marvel or Red Beson.

About the middle of July several of the lettuces were attacked by a mildew, which gradually spread until nearly all of the varieties were affected. Further notes upon this subject may be found in the report of the Botanist. We noticed also on August 4, that the roots of many varieties were attacked by aphides, which caused the foliage to droop as if suffering from extreme dryness.

We noted an interesting fact in connection with the heading of lettuce. The tendency to form a head seems to be promoted by a certain degree of crowding. When the leaves of one plant do not touch those of its neighbor, they have a certain tendency to spread out, but when the plants are sufficiently close so that the leaves are compelled to grow upright, the inclination to form a head is evidently increased. Too much crowding on the other hand tends to prevent the formation of the head. We noted in several cases that plants so remote that the leaves could not touch each other, and those very close together, formed the flower stalk sooner than those which were just close enough so that the outer leaves were compelled to grow half erect.

We made several experimental plantings of lettuce such as earliest and latest ripe seed, green and ripe seed, from upper and lower branches, but we could discover no differences in the crop that can be ascribed to any particular selection of seed.

We learned, however, that the flowers of lettuce do not cross-fertilize from natural agencies, to any marked degree. We grew ten

varieties from seed saved at the station in 1883, all of which had abundant opportunity for cross-fertilization. We were able to detect in the crop from these seeds very few, if any, evidences of mixture from this source.

We found also that it is easy to cross-fertilize varieties of lettuce artificially by simply suspending a plant of one variety in an inverted position, immediately above one of another variety, both plants being in bloom. In our experiments we drove a tall stake by the side of the plant we desired to use as the female parent, to which we tied an entire plant of the one desired as the other parent. As the flower heads are thus brought very near together, it is evident that the pollen given off from the suspended plant falls directly upon the flowers of the other plant. We replaced the suspended plant with a fresh one, occasionally as it became dry. A cross between the Deer Tongue and Green Fringed varieties, obtained in this way, produced a great variety of plants.

CELERY.

We noted in our last report that our results in 1883 showed no advantage in the yield or quality of celery grown in a trench with a very high manuring, over that grown on a level with moderate manuring. We repeated this experiment this year with quite different results.

With the exception of two varieties, one row of each variety named in the table was grown in a trench, and the second on a level but only five feet distant from the first. The trenches were dug one foot deep and of the same width. In the bottom of each was placed a layer four inches in depth of thoroughly rotted barn-yard manure. This was covered with about two inches of fine loam in which the plants were set. In the row grown on the level, the soil before being plowed received a moderate dressing of barn-yard manure with no additional fertilizer. The varieties grown and the yield of each in the two methods of planting are given in the following table. The seeds were planted in boxes in the open air, April 12, and thirty plants of each variety transplanted to the garden July 3:

CELERY.	Per cent vegetated.	Yield of level culture.		Yield of trench culture.	
		lbs.	oz.	lbs.	oz.
Dwarf Large Ribbed White Solid..	49	85	0	96	4
Henderson's White Plume.....	42	59	1	72	12
Hood's Dwarf Red.....	45	44	10	73	12
Red Giant Solid.....	34	47	3	63	7
Solid Ivory.....	70	49	0	51	2
White Solid.....	33	56	4	76	12
White Solid Curled.....	36	45	4		
Yellow Golden Solid.....	59	....		70	0

CELERIAC.	Per cent vegetated.	Yield, level culture.	
		lbs.	oz.
Apple.....	20	29	0
Erfurt.....	10	56	8
Giant Prague.....	42	47	14
Large Early Erfurt.....	46	45	9
Large Smooth Paris.....	72	29	10
New Apple.....	43	15	4
Turnip Rooted.....	78	15	13

In order to make the yields of the different varieties comparable, we have computed it on the basis of one hundred plants. That is to say, the yield of the Dwarf Large Ribbed White Solid variety, of which twenty plants were harvested from the trench, would have weighed ninety-six pounds, four ounces, had there been one hundred plants yielding at the same rate as the twenty plants. A glance at the table shows that the past season, the trench culture yielded decidedly better results than the level culture. The whole difference in the six varieties amounts to about forty pounds, or on the average, about six and a half pounds to the variety. In other words, the difference in favor of the trench culture was about ten per cent in the varieties tested. The length of the stems from the trenches was in most cases nearly double that of the same varieties grown on the level. We noted however, that hollow stems were more numerous in the plants grown in the trench.

Without assuming to account for the discrepancies in the results of 1883 and 1884, we note that the rainfall during August, 1883, exceeded that of the same month in 1884, by more than two inches. We should expect that the plants in the trench would suffer less from want of rain than those on the level.

The deductions suggested are that the injuries resulting from drought may be in some degree averted by growing the plants in trenches.

Comparing the yields of different varieties, we find that the Dwarf Large Ribbed White Solid yielded best, the White Solid second, and Hood's Dwarf Red third.

We were able to detect very little difference in the flavor of the various varieties.

The Red Giant Solid (Vil.) and Hood's Dwarf Red (Hen.), seemed identical. The stems were often more hollow in these than in the other varieties.

The foliage of the White Solid Curled is very distinct, being more cut and curled than in any other variety. It is very attractive in appearance.

Henderson's White Plume Celery.

It was claimed by the introducers of this variety that the stems will blanch of their own accord while exposed to the light, so that it is unnecessary to bank up the plants with earth. We grew a larger number of plants of this variety with the view of testing the validity of these claims. We found them to be correct. Although the young plants differed little in color from those of other varieties, as they became larger the inner leaves assumed a paler shade of green, and toward the latter end of the season, the stems and the inner leaves changed to a creamy white. We tried hilling up the plants in the ordinary way, but no advantage was gained unless it be that the stems were slightly longer and rather more compact. During the month of November, the quality was excellent, but late in December, the stems became somewhat tough, and seemed to lose much of their flavor. In regard to its keeping qualities, we cannot yet speak.

We noted that the foliage of this variety was more affected by blight than that of any other tested; also that when grown in the trench the plants were more affected by blight than when grown on the level. It appears from the table that the difference in the yield in the trench and level culture is less in this variety than in any other, the Solid Ivory excepted. It seems possible, therefore, that owing to the liability of this sort to blight, it may succeed best on rather dry soil.

Experiments in Blanching Celery.

The process of hilling up celery with earth for the purpose of blanching the stems is necessarily quite expensive. We made a series of experiments with the view of discovering a cheaper method of accomplishing the object. On September 15, we placed three-inch drain tiles over twenty-four plants of Boston Market celery; wrapped an equal number with old newspapers, tying the paper on loosely with twine; and a third twenty-four plants we inclosed in straw, by simply placing a sufficient quantity of this material along the row on each side, so that when pressed down, the longest leaves of the plants just appeared above the straw.

The result was satisfactory only with the drain tile. Where inclosed in paper, and especially where surrounded with the straw, the outer stems of the plants rotted.

We found slightly more decay where the tiles were used than we usually find where the plants are hilled up with earth, but the amount was by no means serious.

It seems probable that in localities where drain tile are conveniently obtained, something may be gained in garden culture by their use. They are readily slipped over the plants, and are of course available for more than one season.

CELERIAC.

We grew seven varieties of celeriac, of which the per cent of vegetation and yields are given in the table. In this vegetable, the root is used instead of the blanched stems. The New Apple, though least productive of all, appears to be the most highly improved. In this the roots are very symmetrical and have few fibrous branches. In some of the others, particularly the Erfurt, the roots are very irregular in form and are almost enveloped in a fibrous net-work of small roots.

PEPPER.

We grew the following list of peppers, planting the seeds in boxes in the hot-bed, March 29, transplanting six plants of each to the garden, June 10. We noted the statistics given in the table.

PEPPER.	Per cent vegetated.	First bloom in — days.	First ripe fruit in — days.
Cayenne.....	40	109	143
Cherry.....	10	105	163
Chili.....	10	102	146
Long Red.....	48	112	166
Long Yellow.....	68	107	173
Monstrous.....	24	108	163
Ruby King.....	35	128	178
Spanish Mammoth.....	..	103	163
Sweet Spanish.....	50	109	184
Tomato Shaped.....	4	104	167

As grown by us, the Ruby King (B. M. & Co.) was a synonym of Spanish Mammoth (Vil.).

Perhaps in no other vegetable is the nomenclature so much confused as in the pepper. The names Grossum, Monstrous, Spanish Monstrous, Spanish Mammoth, Sweet Spanish, Mountain, Sweet Mountain, Mammoth, Large Bell and Bull Nose are all used to designate what appears to be but two varieties. We were able to detect no difference between the Monstrous, Spanish Mammoth and Sweet Spanish, the seeds of all of which come from Vilmorin. Andrieux & Co.

TOMATO.

Test of Varieties.

We grew thirty-six names of tomatoes as a test of varieties, planting the seeds in boxes in the green-house* March 27 and 28, transplanting four plants of each to the garden May 22. We have noted the following particulars:

* The boxes were soon after removed to the hot-beds.

	First vegetation in — days.	Per cent vege- tated.	First bloom in — days.	First fruit ripe in — days.	Ten fruits ripe in — days.
TOMATO.					
Arlington	10	93	84	145	151
Conqueror	10	84	84	138	143
Cardinal	11	83	86	141	151
Early York	11	98	82	139	139
Feejee Island	10	48	90	144	157
French Upright .....	..	..	81	122	...
Favorite	10	48	82	141	151
Gen. Grant	10	100	80	132	151
Golden Trophy	10	78	83	148	157
Horsford's No. 0	10	84	73	129	139
Hubbard's Curled Leaf	10	96	76	130	144
Hundred Day	11	76	77	127	139
Improved Large Yellow	10	90	88	147	151
Livingston's Favorite	10	91	85	144	150
Lyman's Mammoth Cluster	14	82	87	147	151
Large Yellow	10	96	80	144	150
New Japanese	14	96	88	145	150
New White Apple	11	92	87	150	152
"No Name"	10	90	73	125	137
New Red Apple	10	60	80	136	146
New York Market	10	74	80	127	143
Orange Field	10	96	74	136	143
Pear	10	100	74	143	148
Powell's	10	92	82	134	150
Paragon	10	66	78	136	143
Perfection	10	68	80	141	143
Precursor	10	74	87	146	143
Plum	10	92	73	131	139
Queen	10	64	73	146	150
Red Chief	10	94	84	143	150
Reade's Island Beauty	10	82	87	148	157
Red Valencia Cluster	10	90	85	148	152
Rochester	10	74	88	148	152
Tilden's New	10	100	84	143	147
Triumph	10	96	84	144	151
Yellow Victor	11	94	85	142	147

The seeds of the French Upright were planted much earlier than those of the other varieties, hence the date of maturity is not comparable. We note the time when the first ten fruits are ripe to show when the different varieties are available for table use. The earliest variety to ripen a fruit was the "No Name." The fruit of this sort, however, is too small to be of value for the table.

Horsford's No. 0, Hundred Day, and Early York, all yielded their first ten ripe fruits in one hundred and thirty-nine days from planting; hence these are to be considered the earliest table varieties on the list.

In 1883, the Alpha was the first variety that ripened ten fruits. The past season this variety did not ripen ten fruits until one hundred and forty-four days from planting, five days later than the three just named.

We find that in the different varieties of tomato the order of earliness is by no means to be depended upon. To illustrate this we present a list of the varieties grown in 1883 and 1884, arranged in their order of earliness, the number of days used being the time at which the first ten fruits were ripe.

	1883.		1884.	
	First ten fruits ripe in — days.	Order of maturity.	First ten fruits ripe in — days.	Order of maturity.
Yellow Victor	136	1	147	4
Conqueror.....	140	2	143	2
Gen. Grant.....	140	2	151	7
Hubbard's Curled Leaf.....	140	2	144	3
Early York	143	3	139	1
Hundred Day.....	143	3	139	1
Orangefield.....	143	3	143	2
Reade's Island Beauty.....	143	3	157	9
Pear.....	147	4	148	5
Tilden's New	147	4	147	4
Triumph	147	4	151	7
New White Apple.....	148	5	152	8
Red Chief.....	148	5	150	6
Powell's.....	159	6	150	6
Red Valencia Cluster.....	159	6	152	8
Livingston's Favorite.....	162	7	150	6
Arlington.....	164	8	151	7
Lyman's Mammoth Cluster.....	164	8	151	7
Golden Trophy.....	166	9	157	9
Rochester.....	169	10	152	8
Feejee Island	170	11	157	9
New Japanese	187	12	150	6

We have numbered the varieties of 1883 in order, giving the same number to the varieties that ripened the same day. It appears that these numbers transferred to their corresponding names in the list of 1884 are very far out of order. Thus the Orangefield ripened ten fruits in both 1883 and 1884, in one hundred and forty-three days. Reade's Island Beauty, on the other hand, which in 1883 ripened the same number in one hundred and forty-three days, required one hundred and fifty-seven days, fourteen days more, to ripen ten fruits in 1884. The New Japanese requiring one hundred and eighty-seven days to ripen ten fruits in 1883, ripened the same number in 1884 in one hundred and fifty days, or thirty-seven days less. Had we taken the date of the first ripe fruit instead of the first ten fruits, the discrepancies would not have been less striking.

It is evident, therefore, that the claims of earliness, for new varieties of the tomato, should be accepted with some caution.

How much may be gained in earliness in the tomato by taking seeds from the earliest ripened fruits? With the view of answering this question, we gathered in 1883 seeds from one of the first fruits to ripen, and from one of the latest, in five of the varieties that ripened among the earliest. We chose the earliest ripening varieties in order to secure the greatest variation in time. The results are given below.

	First vegeta- tion in — days.		Per cent vegetated.		First ripe fruit in — days.		First ten ripe fruits in — days.	
	Earliest seed.	Latest seed.	Earliest seed.	Latest seed.	Earliest seed.	Latest seed.	Earliest seed.	Latest seed.
Alpha.....	10	10	97	92	133	143	144	146
Boston Market..	10.	10	93	82	143	143	145	146
Canada Victor..	11	11	94	74	142	134	144	142
Green Gage....	14	14	96	88	150	150	151	152
Acme.....	11	11	91	99	145	145	154	154

In the case of the Canada Victor the plants from the earliest seed ripened their fruit later than those from the latest seed. In the Acme no difference appears. In the Alpha, on the other hand, shows a marked difference in favor of the earliest seed. On the average the difference is very slight, but the little is in favor of the earliest seed.

Tests with Green and Ripe Seed.

The degree of greenness at which tomato seeds will vegetate is rather remarkable. In our experiments a small percentage of the seeds taken from a tomato fruit not fully developed in size, and which has not commenced to change color toward maturity, vegetated and developed into plants. We found also that fruits gathered when entirely green, and exposed to the sun, will change their color, and assume all the appearance of ripeness. In order to note the influence of green seed upon the resultant plants, we gathered in 1883 seeds from six sample fruits of the Cook's Favorite variety at different stages of ripeness, the first showing no signs of maturity, the second being pale green, the third showing a faint tinge of red, and so on to the sixth, which was fully ripe. On March 28 we planted fifty seeds from each of the six samples in boxes in the green-house, transplanting four plants of each (when so many vegetated), to the garden May 20. The result is given below :

	Commenced to vegetate in — days.	Per cent vegetated.	First ripe fruit in — days.	First ten ripe fruits. in — days.
Very green.....	10	2	126	137
Riper.....	10	84	143	157
Riper.....	10	100	140	151
Riper.....	10	96	141	147
Riper.....	10	88	141	147
Ripest... ..	10	96	146	152

It appears that the plants from the greenest seed ripened ten fruits before those from any other sample had ripened one. It also appears that the fruits grown from the fully ripened seed were the latest of all in ripening. It appears, however, that seed from the greenest fruit vegetated very poorly. We noted also, that the plants appeared feeble than those from any of the other samples of seed. They were, however, very prolific. To intensify the effect of using such unripe seed, we gathered for planting next season six fruits of the same stage of maturity as were selected in 1883, from a plant grown from the greenest seed.

In order to compare plants grown from normally ripened seed with those from seed of fruits gathered very green and ripened by exposure to the sun, we present the results obtained with three varieties as follows:

	First vegetated in — days.		Per cent vegetated.		First ripe fruit in — days.	
	Gath- ered ripe.	Gathered green and ri- pened in sun.	Ripe.	Green ripened in sun.	Ripe.	Green ripened in sun.
Trophy... ..	10	10	90	84	141	143
Extra Early Red...	11	11	86	92	149	129
Howard	12	11	72	84	144	134

In the case of the Trophy it appears that the plants from the seed ripened in the sun matured their first fruits slightly later than those from the normally ripened seed. In the other two varieties the case was very different. In the Extra Early Red the first fruit from seed gathered green and ripened in the sun, ripened twenty days in advance of that from normally ripened seed.

We note here an interesting fact in connection with the fruits picked green and ripened by exposure to the sun. While saving the seeds we noticed that only a portion of them sunk in the water as do normally ripened seeds. With one variety, the Extra Early Red, we placed these lighter and heavier seeds in different packages, planting them separately in the spring. The results appear below:

	Commenced to vegetate in — days.	Per cent vegetated.	First ripe fruit in — days,	First ten ripe fruits in — days.
Lighter Seed....	11	90	141	149
Heavier Seed...	11	92	124	138

It thus appears that although both samples vegetated well, the fruits from the heavier seed matured decidedly earlier than those from the lighter.

We noted that the seeds from the earlier ripened fruits were on the average slightly heavier than those from the later ones of the same variety; also that normally ripened seeds were heavier than those from the same variety gathered green and ripened by exposure to the sun.

The results of our experiments with green and ripe seed suggest that it may be possible to promote earliness in the tomato by the use of partially matured seed.

Does the position of a tomato in the cluster have any influence upon its earliness or other qualities?

As an experiment calculated to answer this question we planted the seeds from eight fruits of the same cluster in order, in the New Currant variety. That is we planted the seeds from the fruit next to the stem of the plant in the first row, the second from the stem in the second row, and so on to the eighth, or terminal fruit of the cluster. The results gave us no difference that we could ascribe to the position of the fruits.

Is the Number of Cells in the Tomato influenced by Heredity.

We noted in our last report that smoothness in the tomato seems to depend in a degree upon the number of cells in the fruit; those varieties in which the fruit is uniformly smooth, as in the Apple, Pear and Plum varieties, invariably having few cells. In order to see whether we can influence the number of cells, by selecting the fewest celled fruits, we saved seeds from a number of fruits of the Early Red Smooth variety, having only three cells each, and from others of the same variety having six or more cells. Plants from each selection of seed were grown side by side the past season with the following result:

To avoid confusion of terms, we designate the plants from the three-celled fruits as A, and those of the six-celled fruits as B.

Fifty fruits gathered at random from A, averaged 4.26 cells each, and the same number from B averaged 4.40 cells each. The difference, though slight, is in favor of the few celled fruits. We note further that while B had three fruits having eight cells each, and two having seven each, A had no fruits with eight cells, and but one with seven cells. The maximum number, therefore, which is the extreme that we assume that it is most desirable to reduce, was very perceptibly decreased. We purpose further experiments in this direction.

How much is gained in Earliness by starting Tomato Plants in the Hot-bed.

We noted in our last report that tomato plants from self-sown seed ripened fruit nearly as early as those started early in the hot-bed. In order to discover how much time is gained in securing ripe fruits by forcing the young plants, we planted a few seeds of the Livingston's Favorite tomato in hills, in the open ground, in the garden, April 24, placing about ten seeds in each hill. These had vegetated on May 12. No especial care was given the young plants, and they were not covered at any time to protect them from frosts. As they grew large enough to crowd each other, they were thinned to one plant in a hill, and afterward received exactly the same treatment as the

plants that were transplanted from the hot-bed. The plants from seeds planted in the open ground ripened the first fruit August 21, or 119 days from planting, while plants of the same variety removed from the hot-bed (planted March 28) ripened their first fruit August 19, or 144 days from planting. In other words, plants grown entirely in the open ground matured a fruit in twenty-five days shorter time than those which were cared for in the hot-bed the first two months of their existence. The result is certainly striking, and suggests that the check given to the plants at the time of transplanting may have been nearly sufficient to overbalance all the time gained by forcing. We were careful to harden the plants in the hot-bed before removing them to the garden, and in order that the shock of transplanting might be felt as little as possible, we potted the plants several days before replanting them in the garden, carefully shading them until they were rooted in the pots. Did the transplanting check the growth so much, or did the heat of the hot-bed enfeeble them? The subject merits further experiment.

Observations concerning the Tomato Rot.

The result of our experiments calculated to give information as to whether or not the disease called "tomato rot" is transmitted through the seed were rather contradictory. We gathered seeds from apparently normal fruits and from fruits destroyed by rot, in the Hathaway's Excelsior variety, and grew the plants from the two samples separately. No difference appeared in the amount of decay in the two plantings.

In a second experiment with the Little Gem variety we selected fruits from the plants that contained the most decayed fruits, and from the one that contained the fewest, growing plants from the two samples separately. In this case a very marked difference appeared in the two plantings. Unexpectedly, this difference was not in the amount of decay, but in the vigor of the plants. The plants in the two rows were so different in appearance that but for the resemblance of the fruit no one would have called them the same variety. We were led to suspect, therefore, that there may be more than one affection that causes tomatoes to decay prematurely.

Other interesting information upon this subject will be found in the report of the Botanist.

Do the flowers of the tomato cross-fertilize?

In our observations we have found both positive and negative evidence upon this question. The past season we noted several fruits of the Golden Trophy variety distinctly marked with red. The fruit of the Trophy tomato varies so much in form and size as to strongly suggest cross-fertilization. The fruit of the Mayflower tomato, which in 1882 was large, was the past season so small as to be nearly worthless for the table. We think, too, that the fruit of the "No Name" variety was decidedly larger in 1883 than it was the past season. On the other hand, the fruit of the Acme, which

we grew in 1882 and 1883 by the side of other varieties, saving our own seed each year, seemed entirely true to type the past season. We have never seen the least evidence of cross-fertilization in the fruit of the Plum, Cherry, Pear, Apple or Currant tomatoes, varieties in which evidence would be very apt to appear if cross-fertilization takes place. Were the variations that we have noted in other varieties due to different causes? As we note that variations are more frequent in comparatively new varieties, we incline to think that they are rather the evidence of unfixedity than of cross-fertilization. Our own experience in growing tomatoes from artificially crossed seed teaches us that at least several generations are necessary to fix a desired type, and we should incline to caution those who are endeavoring to originate new varieties against disseminating their acquisitions too early.

SYNONYMS.

We noted in our last report that several of the tomatoes grown in 1883 bore a very close resemblance to each other, so that we were led to suspect that some of them might be synonyms. With a view of taking further observations, we grew the past season those that bore a striking resemblance to each other, side by side. We give our conclusions as follows :

The *Acme* (Sta.), and *Essex Early Hybrid* (Sib.), are synonyms.

The *Extra Early Red* (Sib.), *Early Red Smooth* (Thor.), and *Early Round Red Smooth* (Greg.), are synonyms.

The *Great Chihuahua* (Greg.), and *President Garfield* (Sib.), are synonyms.

The *Broad Leafed Dwarf* (Thor.), and *Keyes' Early Prolific* (Greg.), are synonyms.

THE PEA.

Test of Varieties.

Of the pea we planted seeds of fifty-eight so-called varieties not previously tested at the Station, besides growing those sorts planted in 1883, upon which we desired to make further observation. We present the table of statistics in the same manner as last year in order that the two tables may be comparable.

PEA.

Description—Number.	NAME.	Date planted.	Commenced vegeta- tion in—days.	First seed ripe in— days.	Last seed ripe in— days.	Number of pods per 100 plants.	Number of peas in 100 average pods.	Average yield of ripe peas per plant in gra. Troy.
Wrinkled sorts in Italics.								
72	American Wonder	April 27	12	71	85	323	413	67
26	Bishop's Dwarf Long Pod.....	"	11	83	110	1,188	481	214
50	Blue Everbearing.....	"	11	85	96	1,077	362	241
45	Blue Prussian (Field pea).....	"	11	89	104	548	482	150
46	Blue Prussian Dwarf	"	11	86	95	656	343	106
21	Caractacus	"	11	73	80	568	425	81
12	Champion of England	"	11	66	107	788	423	138
26	Clamart Early	"	11	75	104	532	368	70
18	Cleveland's Rural New Yorker...	"	11	65	72	408	459	67
51	Criterion	"	11	76	106	588	470	188
19	Daniel O'Rourke.....	"	11	73	101	656	497	150
42	D'Auvergne	"	11	78	104	472	517	93
43	D'Clamart	"	11	82	103	400	455	92
18	Dexter	April 28	12	65	71	274	455	43
91	Dwarf Capuchin	"	12	67	94	780	575	63
91	Dwarf Dutch	"	12	67	103	792	461	142
45	Dwarf Green Imperial	"	11	88	103	676	524	149
70	Dwarf Green St. Michael	"	11	86	95	657	407	145
24	Dwarf Michaux de Hollande....	"	10	77	101	568	609	146
90	Dwarf Royal Edible Pod	"	10	77	95	743	352	75
37	Earliest of all	"	11	65	18	377	410	55
93	Early Crown (Field pea).....	"	10	88	114	1,208	622	219
64	Early Dwarf	"	10	78	95	985	400	63
87	Edible Podded Butter.....	"	10	80	111	352	308	73
92	Edible Podded Dwarf.....	"	10	78	95	605	369	114
29	Etampes Wonder	"	11	75	95	561	572	107
28	Express	"	11	75	77	836	361	49
86	Extra Early Dwarf Breton.....	"	11	78	105	1,016	491	167
44	Fullbasket	"	11	84	95	511	438	188
84	Giant, very large podded Sugar ..	"	11	84	103	440	429	121
96	Golden Drop (Field pea)	"	11	98	111	1,072	472	130
95	Golden Vine (Field pea)	"	11	94	114	1,664	615	232
82	Green Auvergne	"	11	84	106	548	394	108
46	Green Noyau	"	11	84	103	1,144	478	223
94	Grey Winter (Field pea)	"	12	80	107	684	515	142
57	Horford's Market Garden.....	"	11	77	101	1,024	474	167
39	Kentish Invicta	"	11	65	77	817	480	48
76	Knight's Dwarf Green Marrow...	"	11	85	95	745	322	153
68	Knight's Dwarf Marrow.....	"	11	71	96	711	257	89
13	Knight's Tall Green Marrow	"	11	82	111	1,100	531	194
17	Knight's Tall Marrow	"	11	86	170	884	488	147
18	Landreth's Extra Early	"	11	85	71	246	443	62
9	Large Green Normandy	"	11	105	117	896	267	103
81	Large White Podded Sugar.....	"	11	84	99	648	524	161
80	Laxton's Marrow	"	11	85	102	480	517	149
7	Laxton's Superlative	"	11	84	102	540	494	129
23	Leopold 2d	"	11	71	95	589	469	92
49	Laxton's Alpha	"	11	68	96	428	399	63
97	Maple (Field pea)	"	11	96	110	1,186	398	156
60	McLean's Best of All	"	12	91	105	572	353	241
69	McLean's Blue Peter	"	11	73	79	296	523	54
30	Michaux de Rouelle.....	"	11	84	106	1,016	517	197
29	Michaux Ordinaire de Paris	"	11	73	95	766	430	183
80	McLean's Dwarf Prolific.....	"	11	84	96	568	362	98
	Native, from Tenerife (Field pea?)	"	11	84	102	928	433	195
	"New Field Pea—A"	"	12	94	110	1,772	498	119
78	Premium Gem	"	11	77	95	455	399	79
22	Prince Albert (Vil.)	"	12	66	95	716	409	105
	Prince Albert (Fer.).....	"	12	95	106	1,084	527	149
40	Prizetaker	"	12	78	98	396	545	102
18	Reedland	"	12	65	71	217	365	33
32	Shah de Persia.....	"	12	65	77	328	442	...
71	Supplanter	"	12	79	103	568	324	107
31	Sword	"	10	78	100	472	517	140
79	Stratagem	"	14	56	74	312	487	108
10	Tall Green Mammoth	"	11	24	47	65	19	81
11	Telephone	"	11	58	49	65	10	84
18	Thorburn's Early Extra Market ..	"	11	74	39	53	15	66

PEA — (Concluded).

* One pod.

It appears that Cleveland's Rural New Yorker was earliest forming the first pod of edible size in fifty-two days; Dexter, Kentish Invicta, Reedland, Shah de Persia, Landreth's Extra Early and Thorburn's Extra Early Market had pods of edible size in fifty-three days; earliest of all, Express, Prince Albert, and a new sort from Messrs. Bliss, "No. 72," in fifty-four days. Strange to say, the earliest of all, which in 1882 and 1883 led the van in our trials, was surpassed in earliness by seven so-called varieties the past season.

It appears, also, that the Large Green Normandy, a variety received from France, was latest, one planting of Prince Albert second, and Knight's Tall Marrow third. The latter remained fit for table use longer than any other variety, while the Very Dwarf Bretagne matured its crop most rapidly.

The Tall Green Mammoth was most prolific in pods, and the Reedland was least prolific. Bliss' Everbearing and McLean's Best of All, produced the largest weight of peas per plant and Reedland the smallest. The Dwarf Michaux de Hollande gave the largest average number of peas per pod, and Knight's Dwarf Marrow and Large Green Normandy the smallest.

The Shah de Persia, a distinct wrinkled pea received from France, gave its first edible pod in fifty-three days — two days earlier than the American Wonder, which has heretofore enjoyed the reputation of being the earliest wrinkled pea. Another season, however, may show quite a different result.

Tests of Earliest and Latest Ripening Seed.

In 1883 we gave the result of an experiment with the Tom Thumb pea, in which peas from the earliest and latest ripening pods were planted separately. The results showed a very perceptible gain in earliness in the seed from the earliest pods as well as a better vegetation and a slight increase in productiveness. With the view of carrying this experiment further, we gathered last season the earliest and latest ripening pods from eleven varieties of pea, and planted in the garden on April 25, 100 seeds from each selection of each variety. The results are given in the following table :

EARLIEST AND LATEST PODS.		Commenced vegetation in -- days.	Per cent vegetated.	First bloom in -- days.	First edible maturity in -- days.	Days fit for table use.	First pods ripe in -- days.	Last pods ripe in -- days.	Number of pods per 100 plants.	Number of peas in 100 average pods.	Average yield of ripe peas per plant in grs.
British Queen.											
From earliest pods....		11	54	52	68	16	84	107	834	285	155
From latest pods.....		11	63	52	68	17	85	116	664	377	132
Carter's Challenger.											
From earliest pods		11	44	49	65	8	84	101	462	475	130
From latest pods..		11	56	49	65	8	84	101	422	412	109
Carter's Pride of the Market.											
From earliest pods....		12	53	51	68	7	84	102	313	545	106
From latest pods		14	25	51	68	7	85	103	448	616	174
Champion of England.											
From earliest pods....		11	68	43	68	16	84	107	620	590	155
From latest pods.....		11	66	53	82	12	91	107	994	441	171
Culverwell's Telegraph.											
From earliest pods.....		11	53	50	64	10	84	102	415	496	119
From latest pods		11	40	50	64	10	84	101	626	492	160
Day's Early Sunrise.											
From earliest pods... ..		11	59	42	64	6	77	98	607	244	89
From latest pods		11	47	42	65	12	77	107	712	384	126
Earliest of All.											
From earliest pods		11	58	38	54	16	65	76	377	410	55
From latest pods ...		11	47	38	54	16	68	79	471	527	84
Laxton's Long Pod.											
From earliest pods.....		11	49	45	68	9	78	102	919	512	174
From latest pods.....		11	52	50	66	11	78	102	858	576	204
Minimum.											
From earliest pods.....		11	42	40	57	13	66	80	510	482	75
From latest pods		11	78	42	57	13	70	80	293	476	66
Prizetaker Green Marrow.											
From earliest pods.....		11	35	50	70	7	80	101	1151	567	307.
From latest pods.....		11	46	50	68	7	79	99	754	588	189
Telephone.											
From earliest pods		11	32	70	66*	9	84	102	591	569	214
From latest pods.....		11	34	70	65	10	84	105	753	530	240

* One pod.

In 1883 we selected the Tom Thumb pea for this experiment because this variety continues to ripen its seed through a long period. In the present experiment we used varieties without regard to the difference of time between the earliest and latest formed pods. The results show very little difference between the plants grown from the earliest and latest seed, either in earliness, productiveness, or vegetation.

The average earliness shows a difference of one day in favor of the earliest ripened seed, while the average yield of pods shows a difference of eighteen to the hundred plants in favor of the latest ripened seed; the average yield of peas per plant shows a difference of seven grains in favor of the latest ripened seed, and the average of vegetation shows a difference of about one per cent also in favor of the latest ripened seed.

As a whole, the differences are so slight as to be non-committal. When we remember, however, that in several of the varieties tested, the difference in time between the earliest and latest ripening pods is very slight, the average difference in earliness of a single day is a matter of consideration to those who are seeking to promote earliness in peas. The fact that lateness in maturity is accompanied by an increase in yield, is to be expected when we remember that, as a rule, the earliest varieties are less productive than the intermediate or later ones.

Tests of Ripe and Green Seed.

In 1883 we gathered samples of unripe seed from three varieties of pea, the selections varying somewhat in the degree of unripeness. On April 28, these were planted in the garden with the following results:

RIPE AND GREEN SEED.	Date planted.	Commenced vegetation in — days.	Per cent vegetated.	First bloom in — days.	First edible maturity in — days.	Days fit for table use.	First pods ripe in — days.	Last pods ripe in — days.	Number of pods per 100 plants.	Number of peas in 100 average pods.	Average yield of ripe peas per plant in grs.
Blue Peter.											
From seed gathered ripe.	April 28	11	84	40	57	13	68	79	629	391	121
From seed gathered green	"	11	84	40	57	13	68	79	467	410	100
Eugenia.											
From seed gathered ripe.....	"	11	60	40	64	9	77	106	706	317	109
From seed gathered green	"	11	55	40	66	6	72	105	677	385	92
William the First.											
From seed gathered ripe.....	"	11	54	39	57	13	63	88	300	459	65
From seed when just past ed.mat	"	12	9	42	57	16	65	102	1,467	573	346
From seed gather'd at edible mat.	"	12	3	38	58	15	84	109	1,600	728	492

With the exception of the third sample of William the First, the green seeds were only slightly immature. It is evident that the results are contradictory. The sample of William the First, gathered at edible maturity, however, with a very feeble vegetation, gives a surprisingly large yield. It appears that the time of maturity was little influenced. The experiment has value only in being suggestive. If extreme greenness of the seed tends to increase productiveness, a knowledge of the fact is valuable. The evidence suggests further experiment.

Tests of Seed from the most productive and least productive plants.

In 1883, we gathered from thirteen different varieties of pea samples of seed from the plants that produced the largest number of pods, and also from those that produced the smallest number. On April 28, we selected the finest pods from the most productive plants and planted the seeds contained in them with an equal number of seeds from the least productive plants. To avoid confusion of terms, we will speak of the progeny of the most productive plants as A, and that of the least productive ones as B. We offer the results in tabular form, as follows :

MOST AND LEAST PRODUCTIVE PLANTS		Date planted.	Commenced vegetation — days.	Per cent vegetated.	First bloom in — days.	First edible maturity in — days.	Days fit for table use.	First pods ripe in — days.	Last pods ripe in — days.	Number of pods per 100 plants.	Number of peas in 100 average pods.	Average yield of ripe peas per plant in grs.
A...	American Wonder. From most productive plant....	April 28	12	90	42	56	14	77	101	888	501	178
B...	From least productive plant....	"	12	95	42	56	14	77	101	875	448	145
Bishop's Long Pod.												
A...	From most productive plant...	"	11	...	53	71	4	84	107	1,400	463	413
B...	From least productive plants...	"	11	...	53	71	4	84	98	1,391	460	473
Blue Peter.												
A...	From most productive plants...	"	11	52	40	57	13	68	79	691	388	137
B...	From least productive plants...	"	11	100	40	57	11	68	79	658	372	124
Caractacus.												
A...	From most productive plant....	"	11	17	38	54	14	65	102	1,112	516	211
B...	From least productive plant....	"	11	100	49	65	8	78	101	1,839	681	465
Carter's Challenger.												
A...	From most productive plant....	"	11	63	49	65	9	84	101	2,150	622	766
B...	From least productive plant....	"	11	90	50	65	9	84	98	1,570	593	509
Carter's First Crop.												
A...	From most productive plant....	"	11	100	39	54	16	64	79	880	491	180
B...	From least productive plant....	"	11	100	38	56	14	66	79	1,250	486	241
Carter's Premium Gem.												
A...	From most productive plants...	"	15	77	42	56	14	67	101	744	468	158
B...	From least productive plants...	"	11	85	42	56	12	67	98	691	525	154
Dwarf Champion												
A...	From most productive plants...	"	11	67	42	60	10	78	103	2,000	489	421
B...	From least productive plants...	"	12	100	53	70	15	84	101	4,325	643	885
Early Kent.												
A...	From most productive plants...	"	11	82	45	68	13	79	102	2,063	508	418
B...	From least productive plants...	"	11	100	47	65	8	78	101	1,900	524	411
Ferry's Extra Early.												
A...	From most productive plants...	"	11	100	39	53	15	68	79	1,092	492	225
B...	From least productive plants...	"	11	75	45	57	13	77	98	1,622	548	443
Hairs Dwarf Green Marrow.												
A...	From most productive plant ...	"	14	79	53	71	10	91	111	2,012	412	726
B...	From least productive plant ..	"	14	89	58	68	13	78	109	2,173	387	292
Horsford's Market Garden..												
A...	From most productive plant....	"	14	80	58	72	22	93	111	2,075	563	759
B...	From least productive plants...	"	14	20	47	66	18	78	105	8,200	397	588
McLean's Advancer.												
A...	From most productive plant...	"	12	73	55	71	23	87	111	3,595	518	381
B...	From least productive plant...	"	11	93	58	71	13	91	105	2,011	581	608

* One pod.

The outcome of this experiment is quite different from what we anticipated. On the average, the plants of B proved the more productive by two pods to the plant. Strictly, however, the plantings
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cannot be considered as duplicates, since they are of different varieties, which are of varying habit, and mature at different times.

The fact is worthy of note that in the cases where B gives the excess in yield, it is invariably later in maturing than A, and conversely, where A is later in maturing than B, it shows a larger yield.

It is possible that in some cases the unproductive plants of 1883 were enfeebled by unnoticed injuries from the pea weevil in the seed planted; and that thus while possessing abundant inherent vigor, were restricted in their development. Whatever the causes, the results are interesting and suggest further experiment.

The heredity of finely developed pods, however, has been borne out to a striking degree in our trials. We noted in our last report that the seeds of two pods of Laxton's Marvel pea, from the crop of 1882, that contained eleven peas each, produced among others, two pods that likewise contained eleven seeds each, while the seeds from other pods that contained ten peas each produced no pods containing more than ten peas. The past season, fifteen peas were planted, from the eleven seeded pods of 1883, and the plants resulting, twelve in number, bore three pods containing eleven seeds each. We have never seen eleven seeded pods in any other variety, and we found but two in 1882, from the seed of which we grew another two in 1883, and from this we secured three in 1883.

We will add that this careful selection has given us not only very finely developed pods, but also highly productive plants. Thus the twelve plants above named bore the past season 339 pods, or at the rate of 2,825 pods per hundred plants, a yield that is not equalled in our table of varieties.

Tests of Seeds Planted in Order from the Pods.

In order to test the influence of the position of the seeds in the pod upon the resulting plants, we selected in 1883, thirty pods of Culverwell's Telegraph pea, that contained exactly eight peas each. We then removed the seed next to the stem in all the pods, placing the peas thus secured in one packet; the second ones from the stems in another, and so on, numbering the packets successively, until all the peas were removed. On April 28, we planted so many of the peas from each packet as were uninjured by the weevil, in a row by themselves. The results are shown in the table:

TABLE.

PEA.	Date planted.	Commenced vegetation in — days.	Per cent vege- tation.	First bloom in — days.	First edible maturity in — days.	Days fit for table use.	First pods ripe in — days.	Last pods ripe in — days.	Number of pods per 100 plants.	Number of peas in 100 average pods.	Average yield of ripe peas per plant in grs.
Culverwell's Telegraph.											
No. 1 from seed next to stem	April 28	11	89	51	68	16	84	109	1,182	566	442
No. 2 from seed 2d from stem . . .	April 28	11	55	51	68	13	84	105	732	582	281
No. 3 from seed 3d from stem . . .	April 28	11	59	49	65	12	84	111	935	579	315
No. 4 from seed 4th from stem . . .	April 28	11	45	50	68	10	50	110	879	608	311
No. 5 from seed 5th from stem . . .	April 28	11	45	50	68	17	84	114	1,136	504	301
No. 6 from seed 6th from stem . . .	April 28	11	47	51	68	9	84	106	1,057	583	375
No. 7 from seed 7th from stem . . .	April 28	11	38	49	68	9	87	101	1,043	580	391
No. 8 from seed 8th from stem . . .	April 28	11	55	50	68	9	84	105	947	593	281

It will be noticed that the per cent of vegetation, the yields of pods and of peas is slightly highest in the plants from the seeds next the stem, a difference which may be accidental. In order to intensify, if possible, whatever influence the position of the peas in the pod may have upon the progeny, we have gathered for next year's planting the seed next the stem from selected pods from row No. 1, the second from the stem in row No. 2, the third in No. 3, and so on to the last.

Fertilizer Trials.

We made experiments with various fertilizers upon the pea, choosing for the purpose a plat of ground, that had received no fertilizer of any kind since the establishment of the Station.

In order to test the influence of well-rotted stable manure upon the earliness and productiveness of the pea, we manured one row twelve feet long, of the William the First variety very heavily, leaving an adjacent row unmanured. Strange to say, the manure had no visible effect either upon the productiveness or earliness of the yield.

We also fertilized one row of the same length, with each of the following :

1st. One-fourth pound of sulphate of iron in solution.

2nd. The same with two pounds superphosphate.

3rd. Two pounds superphosphate, alone.

4th. Three pounds gypsum, and

5th. Three pounds gypsum, and one pound common salt.

The differences in earliness or yield was not sufficiently marked in any case, so that it could be safely ascribed to the fertilizer used.

Vegetation of Weevil-eaten Peas.

The results obtained with different tests of weevil-eaten peas vary much. In a garden test the past season, with Carter's First Crop pea, but two per cent of those injured by the weevil vegetated, while sixty per cent of the sound peas vegetated.

Results of Cross-fertilization.

Out of many crosses made in 1883, the results of two are worthy of note, viz., a wrinkled pea, a cross of American Wonder fertilized with Earliest of All, that formed a pod of edible size in fifty-two days (as early as the earliest smooth pea on trial) ; and a second, also wrinkled, a cross of Bliss' A. No. 2, fertilized with Laxton's Marvel, that gave the phenomenal yield of ninety pods on one plant, averaging four and a fourth peas per pod, and this with only ordinary cultivation.

SYNONYMS.

In our report for 1883, we published an abstract of our notes to show that the peas tested under the names Philadelphia Extra Early (Thor. 1883), Cleveland's First and Best (Clev. 1883), Ferry's

First and Best (Fer. 1883), Sibley's First and Best (Sib. 1883), Thorburn's First and Best (Thor. 1882), Henderson's First of All (Hen. 1883), and Hancock (Greg. 1883), as grown in the station garden, are, in reality, one and the same variety. The past season, equally carefully prepared notes lead us to conclude that the peas sent out in the spring of 1884, under the names Cleveland's Rural New Yorker, from the Rural New Yorker, Dexter (Greg.), Landreth's Extra Early (Lan.), and Thorburn's Extra Early Market (Thor.), as grown by us, are also synonyms of the Philadelphia Extra Early. It is certain that the samples tested under the above names showed no more variations than duplicate plantings of the same variety often exhibit, and hence, with our present knowledge, we are compelled to pronounce them synonyms. The pea tested under the name Reedland (Lan.), seems to be an enfeebled form of the above, having a slightly dwarfer habit, and giving a smaller yield, without being earlier and possessing no other distinctive characters.

The peas tested under the names Express (Greg.), "No. 72" (Bliss), as grown by us, are also synonyms, but they are not the same as Philadelphia Extra Early.

We have also found the peas under the names Dwarf White Marrowfat (Thor., 1882), Brown's New Dwarf Early Marrowfat (Greg., 1883), and Royal Dwarf Marrowfat (Greg., 1883), to be synonyms.

Hair's Dwarf Green Marrow (Thor., 1882), seems to be a synonym of Knight's Tall Green Marrow (Vil.)

The tendency among seedsmen to rename peculiarly desirable varieties is well illustrated in the case noted, where eleven different names seem to have been given to one variety of the pea. We are aware that the word "variety," as applied to vegetables, is not specifically defined, and, therefore, our opinions upon this subject may be open to severe criticism. It is evident, however, that the differences between two varieties should be greater than between normal individuals of the same variety; and it is because the samples that we call synonyms have not shown these differences that we are led to pronounce them as such. The differences that occur between plants of the same variety, as grown from pure seed, are often quite marked. As an example, we note that Station seed of the Dan. O'Rourke pea, planted April 28, produced pods of edible size in fifty-two days, while seed of the same variety from Vilmorin, Andrieux & Co., of Paris, in an adjacent row required fifty-nine days to form a pod of edible size. The plants from these two samples of seed, however, seemed true to type.

As we noted in our last report, the order of maturity of distinct varieties is not to be depended upon in different plantings, even when these are made from the same packages of seed and upon as nearly as can be secured, the same soil. Much less, then, should the seedsman expect that mere selections from a given variety made through one or two seasons, will preserve distinctive characters.

AN ATTEMPT AT CLASSIFICATION.

We have endeavored to classify the varieties of pea thus far tested at the Station. We present the result of our work with some hesitation through uncertainty whether certain characters delineated are sufficiently fixed to apply for all soils and climates. We have been unable to find many characters that may be considered constant. When it is remembered that the pods and the height of the plant are almost the only characters that have been made the object of selection, we should hardly expect to find constancy in other parts except as correlated with these. We have noted that some characters employed by other authors in describing the pea are by no means constant, and we shall not be surprised if some that we have used will prove equally unreliable. We offer our scheme as the best that we are able to devise with our present knowledge.

Botanical Relations.

The pea belongs to the natural order LEGUMINOSÆ, sub-order PAPILIONACEÆ, tribe VICIÆ, and genus PISUM.

The plant is a herbaceous annual with smooth, more or less glaucous foliage, abruptly pinnate leaves, the common rhachis terminating in a branching tendril, and the base of the petioles clasped with foliaceous stipules larger than the leaflets; slender hollow stems, branching, deeply extending tap roots, axillary papilionaceous flowers, borne one, two, rarely three to the peduncle, giving place to more or less fleshy pods, containing two to eleven smooth or shrivelled seeds.

Agricultural Classification.

Three agricultural species may be recognized as follows:

1st. *Pisum* * *sativum*, the common garden pea; characterized by white or bluish white flowers, followed by pods having a thin, but tenacious lining which gives them firmness and which by contraction in drying causes them to open at their sutures, the halves bending in a spiral. The seeds are used both immature and ripe as table esculents.

2d. *P.** *macrocarpon*, the edible podded pea† (the *sans parchemin* of the French); characterized by its pods being without the parchment like lining of *P** *sativum* and *P** *arvense*, and which do not self open at maturity. The absence of this membrane renders the pods tender and succulent while immature, hence they may be cooked and eaten with the partially grown peas after the manner of "string beans." The seeds are also used like those of *P** *sativum*.

† The name "sugar pea," commonly applied to the varieties of this agricultural species, is very inappropriate, since these peas really contain less sugar than do those of *P** *sativum*.

3d. *P * arvense*, the field pea; having reddish, purple or variegated flowers, the stipules tinged with red where they encircle the stem, and the pods having the parchment like lining of *P * sativum* and like them, self opening at maturity. In this country this agricultural species is grown chiefly for forage, particularly as food for hogs. †

In England and Scotland the seeds are often ground into flour which is used as human food among the peasantry.

These agricultural species are chiefly distinct through their uses and we must at present believe, are probably maintained only by selection.

The varieties of *P * sativum*, are much more numerous than those of either of the other agricultural species. As it is with this species that we have mostly to do, we have found it convenient to sub-divide its varieties.

It seems reasonable to assume that in the garden culture of peas, varieties of dwarf habit were first considered as valuable acquisitions. The color of ripe seed would seem to form a natural division next in order to the height of the plant. The advent of the wrinkled sorts furnished a third opportunity for sub-division, after which it is fair to suppose that the form of the pod became an object of selection. In our classification of the varieties of *P. * sativum* we have followed this apparently logical order as will appear in our analytical key.

The height of the plant, although varying considerably with different soils and seasons and with different selections of seed, is, nevertheless, on the average tolerably constant. It is certainly the most conspicuous character of the pea plant, hence we regard it as a proper basis for classification, despite its variability. It is probable that the height noted in our descriptions will not hold in all cases. On moist mucky soils the vines will doubtless often exceed the height given, while in poor clay soils, they will fall short of it. Of course the reader who does not know whether the variety he wishes to identify is tall, half dwarf, or dwarf, will be obliged to work experimentally for a time.

† The field pea sometimes has white flowers. These white flowered field peas, however, possess the qualities of the primitive garden peas. We have very good reasons for believing that our garden peas were originally obtained by selecting out the white flowered plants grown among field peas. The white flowered plants invariably produce green, cream colored or bluish green seeds, which are milder and sweeter in taste and have a more attractive color when cooked than the brown, reddish or purple peas formed on plants that have colored flowers.

CLASSIFICATION OF P * SATIVUM THE GARDEN PEA.

Analytical Key.

CLASS A. Plant exceeding four feet in height, under average condition.

* Seeds cream colored or white.

† Seeds smooth, or but slightly indented.

§ Pods straight or nearly so. (No varieties described.)

§§ Pods more or less recurved. Three varieties described. Type, White Marrowfat. Nos. 1-3 inclusive.

†† Seeds decidedly shrivelled.

§ Pods straight or nearly so. (No varieties described.)

§§ Pods more or less recurved. One variety described. No. 4 British Queen.

** Seeds green, bluish green, green and cream colored, or bluish green and cream colored.

† Seeds smooth or but slightly indented.

§ Pods straight or nearly so. Two varieties described. Nos. 5 and 6. Type, Challenger.

§§ Pods more or less recurved. Three varieties described. Type, Laxton's Supreme. Nos. 7-9 inclusive.

†† Seeds decidedly shrivelled.

§ Pods straight or nearly so. Six varieties described. Type, Champion of England. Nos. 10-15 inclusive.

§§ Pods more or less recurved. Two varieties described. Type, Knight's Tall Marrow. Nos. 16-17.

CLASS B. Half Dwarf. Plant two to four feet high under average conditions.

* Seeds cream colored or white.

† Seeds smooth or but slightly indented.

§ Pods straight or nearly so. Eight varieties described. Type, Daniel O'Rourke. Nos. 18-25 inclusive.

§§ Pods more or less recurved. Five varieties described. Type, Bishop's Dwarf Prolific. Nos. 26-30 inclusive.

§§§ Pods more or less curved inward toward the stem. One variety described, Sword. No. 31.

†† Seeds decidedly shrivelled.

§ Pods straight or nearly so. Three varieties described. Type, Dwarf Champion. Nos. 32-34 inclusive.

§§ Pods more or less recured. Two varieties described. Type, Laxton's Marvel. Nos. 35-36.

** Seeds green, bluish green, green and cream colored, or bluish green and cream colored.

† Seeds smooth or but slightly indented.

§ Pods straight or nearly so. Four varieties described. Type, Kentish Invicta. Nos. 37-40 inclusive.

§§ Pods more or less recurved. Eight varieties described. Type, Blue Imperial. Nos. 41-48 inclusive.

†† Seeds decidedly shrivelled.

§ Pods straight or nearly so. Seven varieties described. Type, Alpha. Nos. 49-55 inclusive.

§§ Pods more or less recurved. Five varieties described. Type, Market Garden. Nos. 59-60 inclusive.

CLASS C. Plant Dwarf, not exceeding two feet in height under average conditions.

* Seeds cream colored or white.

† Seeds smooth or but slightly indented.

§ Pods straight or nearly so. Six varieties described. Type, Tom Thumb. Nos. 61-66 inclusive.

†† Seeds decidedly shrivelled.

§ Pods straight or nearly so. Two varieties described. Type, Knight's Dwarf Marrow. Nos. 67-68.

** Seeds green, bluish green, green and cream colored, or bluish green and cream colored.

* Seeds smooth or but slightly indented.

§ Pods straight or nearly so. Three varieties described. Type, Blue Peter. Nos. 69-71 inclusive.

** Seeds decidedly shrivelled.

§ Pods straight or nearly so. Eight varieties described. Type, American Wonder. Nos. 72-79 inclusive.

§§ Pods more or less recurved. One variety described. McLean's Dwarf Prolific. No. 80.

Explanation of terms used in the descriptions.*

The word *pea* is used to designate the immature seed when fit for table use. The ripe peas are in every case designated as *seeds*.

The peas are called *compressed* when so crowded in the pod as to flatten the surfaces in contact.

The seeds are called *squared* when the sides are rather distinctly flattened through compression in the pods.

The word *radical* is used to designate the embryo plant, which in some varieties is visible through the seed-coat.

* For explanation of abbreviations used, see P.

The pods are called *inflated* when expanded beyond the requirements of the peas; and *loment-like* when the sides are depressed between the peas so that the outside appears scalloped.

For the benefit of those not accustomed to botanical terms, we explain: *Stipules*, the large leaf-like appendages clasping the stem at the base of the leaf stalks; *Nodes*, the spaces between the joints of the stem; *Peduncle*, the stem that supports the flower or pod, and *Hilum*, the point where the seed is attached to the pod.

The varieties in their respective genera are arranged approximately in the order of their earliness. Where two or more do not differ materially in their season of maturity, they are placed in alphabetical order. For exact data in relation to the earliness and productiveness of the different varieties, we refer the reader to the table in this, and the previous report (1883).

When we have had a choice of names we have made use of the shorter one, using the longer one as a synonym.

An authority given for a synonym indicates that we have not verified it.

Synonyms from the same author are separated by *commas*; those from different authors by *semi-colons*.

Foreign synonyms are omitted, unless when translated, they give a different name from the English name used.

DESCRIPTION OF THE VARIETIES OF P * SATIVUM.

CLASS A. Tall; plant exceeding four feet in height under average conditions.

* *Seeds cream colored or white.*

† *Seeds smooth, or but slightly indented.*

§§ *Pods more or less recurved.*

No. 1. BLACK EYED MARROWFAT. (Thor. 1882.)

Synonyms. *Black Eyed Marrow* (Burr); *Large Black Eyed Marrowfat*.

Plant four to six feet high; foliage ample, slightly glaucous; stem strong, often one-fourth of an inch in diameter; nodes usually not more than three inches apart; peduncles two to four inches long; pods often in pairs two and a half to three and a half inches long, about five-eighths of an inch wide, rounding gradually to the apex; peas four to seven in a pod, whitish green, round or slightly flattened, little compressed, about three-eighths of an inch in diameter; seeds yellowish brown with a black, or dark brown hilum, oval, slightly flattened and indented, about three-eighths of an inch in longest diameter. An ounce contained seventy seeds.

An old variety which has been extensively grown in this country, both as a garden and a field pea. It is very prolific, but quite late, the crop maturing very gradually.

This variety not infrequently sports, producing purple flowers.

No. 2. LAXTON'S LONG POD. (Thor. 1882.)

Synonyms. *Laxton's Prolific Long Pod*, *Laxton's Early Prolific Long Pod*.

Plant four to five feet high; stipules slightly washed with white; stem strong, often one-fourth of an inch in diameter, usually somewhat branched; nodes rarely more than five inches apart; peduncles two to four inches long; pods often in pairs, slightly lighter than the foliage, and quite glaucous, three to three and a half inches long, five-eighths of an inch wide, apex rather blunt in fully developed pods; peas five to nine in a pod, whitish, nearly round, slightly compressed when full grown, three-eighths of an inch in diameter; seeds sometimes pale green, slightly indented, the radical not conspicuous. An ounce contained ninety-nine seeds.

Prolific, late, the crop maturing rather gradually.

Introduced in 1865. (Gar. Chron.) Originated with Thomas Laxton, of Bedford, England.

No. 3. WHITE MARROWFAT. (Thor. 1882.)

Synonyms. *Dwarf White Marrowfat*, *Royal Dwarf Marrowfat*, *Brown's New Dwarf Early Marrowfat*. Probably the *Dwarf Marrow*, or *Dwarf Marrowfat* of Burr.

Plant three to five feet high; foliage rather light green, scarcely glaucous; stipules washed with white toward the base of the plant; stem rather slender, often branched at the base, and sometimes above; nodes rarely more than four inches apart; peduncles one to three inches long; pods paler than the foliage, usually single, two to three and a half inches long, five-eighths of an inch wide, blunt at the apex when fully developed, very plump; peas five to eight in a pod, yellowish green, roundish, much compressed when full grown, about one half of an inch in longest diameter; seeds very smooth, about five-sixteenths of an inch in diameter, radical distinct. An ounce contained seventy-two seeds.

Very prolific, late, maturing its crop promptly.

†† *Seeds decidedly shrivelled.*

§§ *Pods more or less recurved.*

No. 4. BRITISH QUEEN. (Thor. 1882.)

Synonyms. *Hooper's Incomparable*, *Wonder*, *Catull's Wonder*. (Gar. Chron.)

Plant five to seven feet high; stem strong, often one-fourth inch in diameter, often branched at the base and above; stipules glaucous, washed with white; nodes rarely more than three inches apart; peduncles two to four inches long, often shorter toward the top of the plant; pods paler than the foliage, usually two to three and a half inches long, rather blunt at the apex when fully developed; peas four to seven in a pod, whitish green, slightly oblong, much compressed when full grown, one-half inch in longest diameter; seeds sometimes faintly greenish, much flattened and shrivelled, about five-sixteenths of an inch in diameter; radical obscure. An ounce contained seventy-four seeds.

Extremely prolific, late; the pods maturing very gradually. "Less affected by mildew in summer than most other varieties." (Gar. for Profit.)

Known in England prior to 1850. (Gar. Chron.)

** *Seeds green, bluish green, green and cream colored, or bluish green and cream colored.*

† *Seeds smooth or but slightly indented.*

§ *Pods straight or nearly so.*

No. 5. CHALLENGER. (Greg. 1883.)

Synonym. *Carter's Challenger.*

Plant four to five feet high; foliage ample, pale yellowish green, scarcely glaucous, somewhat washed with white; stem strong, often one-fourth of an inch in diameter, slightly angular, often branched at the base, rarely above; peduncles one to three inches long; pods same color as the foliage, glaucous, often in pairs, three to four inches long, three fourths of an inch wide, tapering gradually to the apex; peas five to seven in a pod, pale green, ovate, flattened, scarcely compressed, one-half inch in longest diameter; seeds very pale green, shading to whitish green or cream colored, scarcely indented, about three-eighths or an inch in longest diameter; radical rather obscure. An ounce contained seventy-five seeds.

Moderately prolific, rather late, maturing its crop rather gradually.

No. 6. TELEGRAPH. (Thor. 1882.)

Synonym. *Culverwell's Telegraph.*

Plant four to five feet high; foliage ample, rather light green; stipules slightly glaucous, washed with white; stem strong, often one-fourth of an inch in diameter, often branched at the base and above; nodes rarely more than four inches apart; peduncles one and a half to four inches long; pods scarcely paler than the foliage, usually single, three to three and a half inches long, about three-fourths of an inch wide, sometimes slightly recurved, assuming a ribbed appearance as they approach maturity, tapering gradually to the apex; peas five to eight in a pod, pale green, slightly oblong, somewhat compressed when fully grown, one-half inch in longest diameter; seeds pale dull green, shading to creamy white, scarcely indented, nearly three-eighths of an inch in longest diameter; radical rather obscure. An ounce contained seventy-five seeds.

Moderately prolific, rather late, maturing its crop rather gradually.

Originated about 1868, with Mr. William Culverwell, of England, from a claimed cross between Veitch's Perfection and Laxton's Prolific. (Gar. Chron.)

§§ *Pods more or less re-curved.*

No. 7. LAXTON'S SUPERLATIVE. (Greg.)

Plant three to five feet high; stipules scarcely glaucous, washed with white; stem medium to large, rarely branched; nodes usually not more than four inches apart; peduncles one to two and a half inches long, rather slender; pods scarcely paler than the foliage, curved most toward the apex, remarkably inflated, often four inches long, five-eighths of an inch wide, and three-fourths of an inch thick, developing far in advance of the peas, rounding very gradually to

the apex ; peas five to eight in a pod, pale green, flattened at the sides, though scarcely touching the pod, hardly in contact, one-half inch in longest diameter ; seeds mostly cream colored, roundish, scarcely indented, about three-eighths of an inch in diameter ; radical distinct. An ounce contained eighty seeds.

Not prolific, rather late, maturing its crop promptly.

Introduced about 1872. A claimed cross between Veitch's Perfection and Little Gem. (Gar. Chron.)

No. 8. LAXTON'S SUPREME. (Greg. 1883.)

Synonyms. *Auvergne Green*, (Fr.) *Pois serpette vert*, (Ger.) *Grüne Auvergne* (Vil.)

Plant three to five feet high ; foliage pale green ; stipules and leaflets rather large, stipules slightly glaucous, washed with white ; stem strong, often branched at the base and above ; nodes rarely more than three inches apart ; peduncles one to three inches long ; pods same color as the foliage, usually single, two to three inches long, about five-eighths of an inch wide, thicker than broad, tapering gradually to apex ; peas six to eight in a pod, roundish, compressed when full grown, nearly one-half inch in diameter ; seeds dull green, shading in some specimens to cream color, or bluish white, roundish, slightly indented, about five-sixteenths of an inch in diameter ; radical distinct. An ounce contained ninety-one seeds.

Rather prolific, quite late, maturing its crop very gradually.

Introduced in 1867.

"One of the first acquisitions of Mr. Laxton, and it has proved to be one of the best. It is hardy, and is remarkable for the beauty of its pods." (*Les Plantes Potagères*.)

No. 9. LARGE GREEN NORMANDY. (Vil.)

Synonyms. (Fr.) *Pois Vert Normand*, *P. carré vert* (Ger.) *Grosse grüne Normand-(erbse)*, Vil.

Plant five feet or more in height ; foliage rather deep green ; stipules and leaflets large ; stem strong, angular ; nodes rarely more than four inches apart ; peduncles one-fourth to one inch long ; pods little paler than the foliage, very often in pairs, loment-like, slightly re-curved, two to three inches long, five-eighths of an inch wide, plump, rounding rather gradually to the apex ; peas four to six in a pod, whitish green, much flattened by compression against the sides of the pod, one-half inch in longest diameter ; seeds remarkably large, very pale dull green, shading to bluish white or creamy white, slightly oblong, somewhat indented, nearly one-half inch in longest diameter ; radical distinct. An ounce contained sixty-nine seeds.

Moderately productive and extremely late.

†† Seeds decidedly shrivelled.

§ Pods straight or nearly so.

No. 10. TALL GREEN MAMMOTH (Vil.)

Synonyms. *Monarch*, *Strathmore Hero*, *King of the Marrows*, *Green Tall Square Mammoth* (Fr.) *Pois ridé grande vert Mammoth* (Vil.)

Plant three to five feet high ; foliage deep green, stipules slightly glaucous, slightly washed with white ; stem often branched at the base and above ; nodes rarely more than four inches apart ; peduncles one to four inches long ; pods paler than the foliage, often in pairs, sometimes slightly recurved, two to three inches long, one-half inch wide, rather blunt at the apex when fully developed, very plump ; peas four to seven in a pod, whitish green, slightly oblong, nearly one-half inch in longest diameter ; seeds pale green or cream colored, sometimes almost white, much shrivelled, nearly three-eighths of an inch in diameter ; radical obscure. An ounce contained 100 seeds.

Very prolific, medium in season, maturing its crop very gradually.

No. 11. TELEPHONE. (Clev. 1883.)

Synonym. *Carter's Telephone*.

Plant three to four feet high ; foliage light green, very ample ; stipules scarcely glaucous, abundantly washed with white, wavy on the margins ; stem strong, often one-fourth inch or more in diameter, sometimes branched at the base and above ; nodes rarely exceeding four inches apart ; peduncles one to four inches long, strong ; pods scarcely paler than the foliage, often in pairs, sometimes slightly recurved or curved inwards, three to four inches long, three-fourths of an inch wide, glaucous, assuming a ribbed appearance as they approach maturity, rounding very gradually to the apex, sometimes slightly inflated ; peas four to nine in a pod, pale yellowish green, ovate flattened, one-half inch in longest diameter, in contact, but not compressed ; seeds varying in color from almost white to very pale green, shrivelled and indented, with the radical almost invisible, fully three-eighths of an inch in longest diameter. An ounce contained seventy-seven seeds.

Prolific, medium in season, maturing its crop promptly.

Introduced into this country about 1880.

No. 12. CHAMPION OF ENGLAND. (Thor. 1882.)

Synonym. *Fairbeard's Champion of England*, Burr.

Plant three to five feet high ; foliage rather pale green, slightly glaucous ; stipules slightly washed with white, rather large ; stem often branched both at the base and above ; nodes rarely exceeding three inches apart ; peduncles one-half inch to one and a half inches long ; pods scarcely paler than the foliage, two to three and a half inches long, five-eighths of an inch wide, very often in pairs, in some strains often slightly re-curved, very blunt at the apex when fully developed, plump ; peas four to nine in a pod, whitish green, much compressed when full grown, oblong, one-half inch in longest diameter ; seeds shading from pale olive green to creamy white, much shrivelled, about five-sixteenths of an inch in longest diameter, radical invisible. An ounce contained 101 seeds.

Very prolific, rather late, maturing its crop gradually.

This is one of the most extensively cultivated varieties, both for home use and market. In flavor and sweetness it is unsurpassed. It is originally from England, and seems to have been introduced into this country about 1850.

No. 13. KNIGHT'S TALL GREEN MARROW. (Vil.)

Plant three to five feet high; foliage rather light-green; stipules scarcely glaucous, slightly washed with white; stem, medium or large, sometimes branched at the base, often above; nodes rarely more than two and a half inches apart; peduncles one to three inches long; pods paler than the foliage, often in pairs, two to three inches long, nearly five-eighths of an inch wide, often slightly recurved, very blunt at the apex when fully developed, usually very plump; peas four to eight in a pod, whitish-green, slightly oblong, much compressed in full-grown pods, nearly half an inch in longest diameter; seeds shading from pale bluish-green to creamy white, much shrivelled, nearly three-eighths of an inch in diameter, radical obscure. An ounce contained 110 seeds.

Rather prolific, and rather late, maturing its crop very gradually.

One of the original Knight's Marrows originated with Mr. Thomas Andrew Knight at Downton Castle, England, prior to 1828.

No. 14. ADVANCER. (Thor., 1882.)

Synonym. *McLean's Advancer*.

Plant about four to five feet high; foliage rather pale-green, glaucous; stipules slightly washed with white; stem branched at the base and above; nodes rarely more than four inches apart; peduncles one to four inches long; pods paler than the foliage, two to three inches long, one-half inch wide, usually single, apex blunt in fully developed pods; peas five to eight in a pod, whitish-green, compressed when full grown, nearly half an inch in longest diameter; seeds pale bluish-green, shading to creamy-white, somewhat flattened, much shrivelled, one-quarter to one-third inch in diameter, radical, not very distinct. An ounce contained 106 seeds.

Very prolific, rather late, ripening the crop rather promptly.

This variety bears a close resemblance to the Champion of England. Introduced about 1864 by Dr. McLean of Cholchester, England. (Gar. Chron.)

No. 15. VEITCH'S PERFECTION. (Hen. 1883.)

Synonym. *Dickson's New Paragon*. (Gar. Chron.)

Plant three and a half to four feet high; foliage ample; stipules slightly glaucous, scarcely washed with white; stem strong, much branched at the base, and often above; nodes rarely more than three inches apart; peduncles one and a half to three inches long, paler than the foliage; pods often in pairs, two and a half to three inches long, five-eighths of an inch wide, tapering gradually to the apex; peas four to six in a pod, whitish-green, flattened, nearly one-half inch in longest diameter; seeds very dull pale-green, shading to bluish-white, much flattened and shrivelled, about five-sixteenths of an inch in longest diameter, radical obscure. An ounce contained ninety-five seeds.

Extremely prolific, very late, maturing its crop very slowly.

Selected from Hair's Dwarf Mammoth. Introduced prior to 1865. (Gar. Chron.)

§§ Pods more or less recurved.

No. 16. COMMANDER-IN-CHIEF. (Greg. 1883.)

Synonym. *Carter's Commander-in-chief*.

Plant about four feet high; foliage ample, rather deep-green, scarcely glaucous, or washed with white; stem slightly angular, often branched at base, rarely above; nodes rarely more than four inches apart; peduncles one to three inches long; pods of the same shade as the foliage, usually single, two to three inches long, one-half inch wide, blunt at the apex when fully developed; peas six to eight in a pod, pale-green, slightly oblong, compressed when full-grown, three-eighths of an inch in longest diameter; seeds pale-green, shading to cream colored or bluish-white, much shrivelled, about one-quarter of an inch in longest diameter. An ounce contained 122 seeds.

Not very prolific, late, maturing its crop very slowly.

New in this country in 1877.

No. 17. KNIGHT'S TALL MARROW. (Vil.)

Synonym. (Fr.) *Pois de Knight*, *P. ridé de Knight sucré*, *P. du Brésil*. (Vil.)

Plant five feet or more in height; foliage medium, stipules slightly glaucous, washed with white; stem little branched; nodes seldom exceeding three inches apart; peduncles one-half inch to one and a half inches long; pods slightly paler than the foliage, very often in pairs, slightly recurved, blunt at the apex when fully developed, two to three inches long, five-eighths of an inch wide, plump; peas four to seven in a pod, whitish-green, squared by compression when full grown, about seven sixteenths of an inch in diameter; seeds creamy-white, very much shrivelled, averaging about three-eighths of an inch in diameter, radical obscure. An ounce contained 100 seeds.

Not prolific, very late, maturing its crop remarkably slowly.

Originated with Thomas Andrew Knight, Esq., of Downton Castle, England. Offered by Thorburn in 1828.

Class B, Half Dwarf; plant two to four feet high under average conditions.

* *Seeds cream-colored or white.*

† *Seeds smooth or but slightly indented.*

§ *Pods straight, or nearly so.*

No. 18. PHILADELPHIA. (Thor., 1882.)

Synonym. *Philadelphia Extra Early*, *Extra Early Philadelphia*, *Cleveland's First and Best*, *Cleveland's Rural New Yorker*, *Dexter*, *Thorburn's Extra Early Market*, *Landreth's Extra Early*, *Ferry's First and Best*, *Sibley's First and Best*, *Thorburn's First and Best*, *Henderson's First of All*, *Hancock*.

Plant one and a half to three feet high; foliage scanty, light-

green; stipules slightly washed with white; stem slender, sometimes branched at the base; nodes rarely more than three inches apart; peduncles one to three inches long; pods paler than the foliage, usually single, two to three inches long, one-half inch wide, very blunt at the apex when fully developed; peas five to eight in a pod, pale-green, roundish, much compressed when full grown, three-eighths of an inch in diameter; seeds cream-colored, shading toward green, sometimes slightly indented, about one-fourth inch in diameter, radical, not very distinct. An ounce contained 119 seeds.

Not prolific, extremely early, maturing its crop very promptly. The Reedland (Land.) seems to be a sub-variety.

It seems probable that this variety has been obtained by selection from the Daniel O'Rourke, and though the latter from the Early Kent and Early Frame.

No. 19. DANIEL O'ROURKE. (Thor. 1882.)

Synonyms. *Extra Early Daniel O'Rourke*, *Dan O'Rourke*, *Early Dan O'Rourke*, *Sangster's No. 1*, *Sevastopol*, *Carter's Earliest*, *Veitch's First Early*, *Sutton's Champion*, *Dunnet's First Early*. (Gar. Chron.) (Fr.) *Pois Daniel*. (Vil.)

Plant two to three feet high; foliage rather deep green, somewhat scanty; stipules slightly glaucous, washed with white; stem often branched at the base, rarely above; nodes rarely more than three inches apart; peduncles about one-half an inch long; pods paler than the foliage, often in pairs, in some strains slightly recurved, two to two and a half inches long, blunt at the apex when fully developed; peas five to eight in a pod, pale green, compressed when full grown, about three-eighths of an inch in diameter; seeds sometimes shading toward green, roundish, very smooth, about five-sixteenths of an inch in diameter, radical rather distinct. An ounce contained 122 seeds.

Moderately prolific, very early, maturing its crop rather gradually.

Advertised by Waite & Co., of England, as a new pea in 1853. (Gar. Chron.)

No. 20. CARTER'S FIRST CROP. (Sib. 1883.)

* Synonyms. *Dixon's First and Best*, *Dilliston's Early*, *Ring-leader*, *Sutton's Ringleader*, *Veitch's Early*. (Gar. Chron.)

Plant two to three feet high; foliage rather deep green, scarcely glaucous; stipules washed with white; stem slender, sometimes branched at base, rarely above; nodes rarely more than three inches apart; peduncles two to two and a half inches long; pods usually single, paler than the foliage, two to two and a half inches long, one-half inch wide, blunt at the apex when fully developed; peas five to seven in a pod, pale green, compressed when full grown, three-eighths of an inch in longest diameter; seeds cream-colored or

* It will be observed that one of the synonyms of this variety is also given by Vilmorin to the next. In our test there was a marked difference in the prolificacy of the two.

white (rarely green); nearly round, very smooth, about five sixteenths of an inch in diameter, radical distinct. An ounce contained 123 seeds.

Not prolific, rather early, maturing its crop rather gradually.

Introduced under this name in 1865. Derived through selection from the Early Kent. (Gar. Chron.)

No. 21. CARACTACUS. (Sib. 1883.)

Synonyms. *Waite's Caractacus*, *Dickson's First and Best*, *Improved Early Champion*, *Washington*, *Taber's Perfection*, *Sangster's No. 1*. (Vil.)

Plant about three feet high; foliage rather deep green, scarcely washed with white, slightly glaucous; stem sometimes branched at the base, rarely above; nodes rarely more than two inches apart; peduncles three-fourths to three inches long; pods paler than the foliage, often in pairs, glaucous, two to two and a half inches long, one-half inch wide, blunt at the apex when fully developed; peas five to seven in a pod, whitish green, somewhat compressed when full grown, very slightly oblong, three-eighths of an inch in longest diameter; seeds roundish, cream-colored, sometimes shading toward green, very smooth, about five-sixteenths of an inch in diameter, radical very distinct. An ounce contained 117 seeds.

Very prolific, rather early, maturing its crop gradually.

No. 22. EARLY KENT. (Sib. 1883.)

Synonyms. *Extra Early Kent*, *Prince Albert*, *Early Prince Albert*, *Early May* (Burr), *Early Waterloo*, *Charlton*, *Hotspur*, *Dilliston's Early*; (Gar. Chron.), (Fr.) *Pois hâtif de Plainpalais*, *P. de Regneville*, *P. brésilien*, *P. hâtif uniflore de Gendbrugge*. (Vil.) *Early Emperor* and *Early Frame* have been given as synonyms to this variety. (Gar. Chron.) *Ringleader* and *Sangster's No. 1. Improved* are also given by Vilmorin.

Plant two to three feet high; foliage scarcely glaucous; stem slender, sometimes branched at the base, rarely above; nodes rarely more than four inches apart; peduncles one inch to three inches long; pods slightly paler than the foliage, frequently in pairs, sometimes slightly recurved, two to two and a half inches long, one-half inch wide, very blunt at the apex when fully developed; peas four to seven in a pod, pale green, roundish or slightly oblong, slightly compressed when full grown, three-eighths of an inch in longest diameter; seeds roundish, sometimes shading towards green, very smooth, about one-fourth of an inch in diameter, radical very distinct. An ounce contained 135 seeds.

Not very prolific, rather early, maturing its crop rather gradually.

An old variety, not much grown at the present time.

No. 23. LEOPOLD SECOND. (Vil.)

Plant two to two and a half feet high; foliage medium; stipules slightly glaucous, much, and leaflets slightly washed with white;

stem rarely branched; nodes rarely more than three inches apart; peduncles one-half inch to one and a half inches long; pods usually in pairs, paler than the foliage, two to three inches long, rather more than one-half inch wide, rounding rather abruptly to the apex, plump; peas four to seven in a pod, whitish green, roundish, in contact, but not compressed; seeds round, very smooth, one-fourth inch in diameter, radical distinct. An ounce contained 120 seeds.

Moderately prolific, rather early, maturing its crop promptly.

No. 24. DWARF MICHAUX DE HOLLANDE. (Vil.)

Probably identical with Michaux de Hollande of Vil.

Synonyms. *Early Emperor*; (Fr.) *Pois prime*,* etc.

Plant two and a half to three feet high; foliage rather deep green; stipules scarcely glaucous, washed with white; stem medium, rarely branched; nodes rarely more than four inches apart; peduncles one-half inch to three and a half inches long; pods slightly paler than the foliage, often in pairs, straight or slightly recurved, two to two and a half inches long, one-half inch wide, very blunt at the apex when fully developed; peas four to seven in a pod, whitish green, compressed when full grown, three-eighths of an inch in diameter; seeds cream-colored, sometimes very faintly tinged green, slightly squared, one-fourth of an inch in diameter, radical very distinct. An ounce contained 115 seeds.

Moderately prolific, medium in season, maturing its crop gradually.

No. 25. BISHOP'S LONG POD. (Thor. 1882).

Synonyms. *Bishop's New Long Podded*, *Bishop's Dwarf Long Pod*, *Bishop's Improved*, *Bishop's Long Podded*, (Fr.) *Pois nain Bishop à longues cosses*. (Vil.).

Plant one and a half to two feet high; foliage scarcely washed with white; stem often branched both at the base and above; nodes rarely more than two inches apart; peduncles one to two inches long; pods often in pairs, paler than the foliage, two to three and a half inches long, seven-eighths of an inch wide, thin in proportion to the width, rounded gradually to the apex; peas three to seven in a pod, whitish-green, somewhat flattened, one-half inch in longest diameter; seeds cream colored, sometimes nearly white, slightly oval, scarcely shrivelled, three-eighths of an inch in longest diameter, radical distinct. An ounce contained sixty-six seeds.

Moderately prolific, rather late, maturing its crop rather promptly.

Said to be a cross between Bishop's Dwarf and the Marrowfat.

Known in England prior to 1850. (Gar. Chron.).

§§ Pods more or less recurved.

* For many other synonyms see *Les Plantes Potagères*, p. 127.

No. 26. CLAMART EARLY. (Vil.).

Plant about two and a half feet high; foliage medium, leaflets very small towards the top of the plant; stipules slightly glaucous, scarcely washed with white; stem rather strong, seldom branched; nodes rarely more than four inches apart; peduncles one-half to four inches long; pods paler than the foliage, frequently in pairs, usually more or less recurved, one to three inches long, scarcely one-half inch wide, very plump when fully developed, but often poorly filled, apex not very blunt; peas five to seven in a pod, whitish green, much compressed, three-eighths of an inch in diameter; seeds cream colored, angular from compression, but scarcely shrivelled, about one-fourth inch in diameter, radical distinct. An ounce contained 111 seeds.

Not prolific, rather early, maturing its crop rather slowly.

No. 27. BISHOP'S DWARF PROLIFIC. (Thor. 1882).

Synonym. *Bishop's Early Dwarf*.

Plant about two feet high; stipules and leaflets rather small, scarcely washed with white; stem often branched at the base, rarely above; nodes rarely more than two inches apart; peduncles one to three inches long; pods slightly paler than the foliage, usually in pairs, two to three inches long, about five-eighths of an inch wide, rather thick, tapering gradually to the apex; peas four to six in a pod, nearly round, greenish white, compressed when full grown, nearly half an inch in longest diameter; seeds smooth, nearly round, one-fourth inch in diameter, radical very distinct. An ounce contained ninety-eight seeds.

Not productive, medium in season, maturing its crop rather gradually.

An old variety not much grown at the present time.

First made known in 1825, by Mr. D. Bishop, near Perth, England. (Gar. Chron.).

No. 28. ETAMPES WONDER. (Vil.).

Synonym. *Pois Merveille D'Étampes*. (Vil.).

Plant about two and a half feet high; foliage light green, not glaucous; stipules scarcely washed with white; stem medium to large, often branched at the base, rarely if ever above; nodes seldom more than four inches apart; peduncles one-half inch to two and a half inches long; pods scarcely paler than the foliage, very often in pairs, sometimes straight, two to three inches long, one-half inch wide, very plumply filled, rounding very gradually to the apex; peas six to nine in a pod, whitish green, roundish, much compressed when full grown, three-eighths of an inch in diameter; seeds sometimes faintly tinged green, nearly round, very smooth, rather more than one-fourth inch in diameter, radical distinct. An ounce contained 109 seeds.

Moderately prolific, medium in season, maturing its crop very promptly.

No. 29. MICHAUX ORDINAIRE de Paris. (Vil.)

Probably the same as *Michaux ordinaire* to which Vilmorin gives as synonyms *Early Frame*, (Fr.) *Pois de la Sainte-Catherine*, *Petit pois de Paris*, (Ger.) *Weisse frühe Pariser* (*Erbse*). (Les Plantes Potagères).

Plant about three feet high; foliage medium; stipules slightly glaucous, usually washed with white; stem medium, often branched at the base and above; nodes rarely more than four inches apart; peduncles one inch to three and a half inches long; pods paler than the foliage, often in pairs, slightly recurved, one and a half to two and a half inches long, one-half inch wide, rather blunt at the apex when fully developed, plump; peas four to six in a pod, whitish green, roundish, scarcely compressed, three-eighths inch in diameter, radical very distinct. An ounce contained 108 seeds.

Moderately prolific, medium in season, maturing its crop promptly.

No. 30. MICHAUX DE ROUELLE. (Vil.)

Plant about three feet high; foliage rather light green; stipules slightly glaucous, much washed with white; stem large, often branched at the base and above; nodes rarely more than three inches apart; peduncles one-half inch to three inches long; pods slightly paler than the foliage, often in pairs, sometimes straight, usually only slightly recurved, two to three and a half inches long, five-eighths of an inch wide, very plump, rounding to the apex; peas five to nine in a pod, whitish green, in contact, but not compressed, scarcely three-eighths of an inch in diameter, radical distinct. An ounce contained 103 seeds.

Moderately prolific, rather late, maturing its crop very slowly.

§§§ *Pods curved inward towards the stem.*

No. 31. SWORD. (Vil.)

Synonyms. *White Sword*, (Fr.) *Pois sabre*. (Vil.)

Plant two and a half to four feet high; foliage medium; stipules and leaflets rather large, stipules glaucous, usually washed with white; stem medium, rarely branched; nodes rarely more than three inches apart; peduncles rarely more than one inch long; pods paler than the foliage, sometimes in pairs, strongly curved inward towards the stem, very plump, sloping abruptly to the apex, two to three inches long, five-eighths of an inch wide; peas four to seven in a pod, pale green, roundish, in contact, but not compressed, nearly one-half inch diameter; seeds slightly oblong, somewhat angular in form, sometimes slightly shrivelled, nearly or quite three-eighths of an inch in diameter, radical very distinct. An ounce contained seventy-two seeds.

Moderately prolific, medium in season, maturing its crop promptly.

†† *Seeds decidedly shrivelled.*

§ *Pods straight or nearly so.*

No. 32. THE SHAH. (Vil.)

Synonym. *Shah de Perse*. (Vil.)

Plant about two feet high; foliage pale green; stipules scarcely glaucous or washed with white; stem slender, rarely if ever

branched; nodes rarely more than three inches apart; peduncles one and a half inch to two and a half inches long; pods single, paler than the foliage, sometimes slightly recurved, one and a half to two and a half inches long, one-half inch wide, very plump and very blunt at the apex when fully developed; peas three to seven in a pod, whitish green, much compressed in fully developed pods, three-eighths of an inch in diameter; seeds very much shrivelled, one-fourth of an inch in longest diameter, radical rather obscure. An ounce contained 144 seeds.

Not prolific, but very early, maturing its crop slowly.

Originated about 1875 with Mr. Thomas Laxton of Bedford, Eng.

No. 33. DWARF CHAMPION. (Fer. 1883.)

Plant three to four feet high; foliage scarcely glaucous; stipules slightly washed with white; stem rather slender, usually branched at the base; nodes rarely more than four inches apart; peduncles two to three inches long; pods slightly paler than the foliage, single, two and a half to three inches long, one-half inch wide, very blunt at the apex when fully developed; peas four to six in a pod, whitish green, somewhat compressed when full grown, three-eighths of an inch in diameter; seeds very much shrivelled, usually showing two shades of cream color, about one-fourth of an inch in diameter, radical rather distinct. An ounce contained 123 seeds.

Extremely prolific, medium in season, maturing its crop very gradually.

No. 34. DAY'S EARLY SUNRISE. (Thor. 1882.)

Plant two to three feet high; foliage rather deep green; stipules scarcely washed with white, very slightly glaucous; stem sometimes branched at the base, rarely above; nodes rarely more than two inches apart; pods usually in pairs, scarcely if at all paler than the foliage, two and a half to three inches long, about one-half inch wide, not well filled, tapering gradually to the apex; peas two to seven in a pod, flattened, whitish green, not compressed, one-half inch in longest diameter; seeds flattened, sometimes shading toward green, not much shrivelled, three-eighths of an inch in longest diameter, radical not very distinct. An ounce contained sixty-nine seeds.

Moderately prolific, rather late, maturing its crop rather gradually.

This variety has a very striking resemblance to the Eugenia pea, the only apparent difference being that the pods are straight, the seeds less shrivelled, and that it is a little less prolific.

Introduced by Waite & Co., England, in 1881. (Gar. Chron.)

§§ *Pods more or less recurved.*

No. 35. EUGENIA. (Thor. 1882.)

Synonym. *Alliance*. (Burr, and Vil.)

Plant two and a half to three and a half feet high; foliage deep green; stipules glaucous, washed with white toward the base of the plant; stem rather slender, not often branched; nodes rarely more than three inches apart; peduncles three-fourths of an inch to two

inches long ; pods same color as foliage, two to four inches long, five-eighths of an inch wide, shortest and usually single toward the base of the plant, frequently in pairs toward the top, tapering gradually to the apex ; peas one to eight in a pod ; the pods toward the base usually very poorly filled, pale green, flattened, ovate, about one-half inch in longest diameter ; seeds much shrivelled and flattened, showing two shades of cream color, about three-eighths of an inch in longest diameter, radical obscure. An ounce contained eighty-six seeds.

Prolific, rather late, maturing its crop very slowly. Introduced prior to 1868. (Gar. Chron.)

No. 36. LAXTON'S MARVEL. (Thor. 1882.)

Plant two to three feet high ; foliage ample, often wavy, rather deep, slightly bluish green ; stipules slightly glaucous, little washed with white ; stem medium to large, often branched at the base and above ; nodes rarely more than three inches apart ; peduncles one-half inch to two inches long, remarkably strong ; pods often in pairs, paler than the foliage, three to three and a half (rarely four) inches long, five eighths of an inch wide, rounding gradually to the apex ; peas six to nine (rarely ten and eleven) in a pod, whitish green, slightly flattened, somewhat compressed when full grown, nearly one-half inch in longest diameter ; seeds shaded toward white, slightly oblong, flattened, thickest toward the hilum, about seven-sixteenths of an inch in longest diameter, radical obscure. An ounce contained eighty seeds.

Prolific, late, maturing its crop rather promptly.

*** Seeds green, bluish green, green and cream colored, or bluish green and cream colored.*

† Seeds smooth or but slightly indented.

§ Pods straight or nearly so.

No. 37. EARLIEST OF ALL. (Thor. 1882.)

Synonym. *Laxton's Earliest of All.*

Plant about two feet high, lacking in vigor ; foliage light green ; leaflets and stipules rather small, stipules very slightly washed with white ; stem very slender, sometimes branched ; nodes rarely more than four inches apart ; peduncles one and a half to six inches long ; pods paler than the foliage, usually single, two to two and a half inches long, one-half of an inch wide, blunt at the apex when fully developed ; peas three to five in a pod, pale green, roundish, compressed when full grown, three-eighths of an inch in diameter ; seeds dull pale bluish green, shading to nearly white, about one-fourth of an inch in diameter, radical distinct. An ounce contained 142 seeds.

Not prolific, but remarkably early, maturing its crop very promptly.

Introduced about the year 1881, by Thomas Laxton, of Bedford, England.

No. 38. EXPRESS. (Greg.)

Synonym. "*Bliss No. 72*," of Station growing.

Plant about two feet high; foliage light green, not glaucous; stipules scarcely washed with white; stem slender, rarely branched; nodes rarely more than four inches apart; peduncles one-half to two and a half inches long; pods single, paler than foliage, straight, very blunt at the apex when fully developed, one and a half to two and a half inches long, one-half inch wide, very plumply filled; peas four to seven in a pod, greenish white, roundish, very slightly flattened by compression, three-eighths of an inch in diameter; seeds very dull whitish green, roundish, slightly indented, one-fourth of an inch in diameter, radical very distinct. An ounce contained 126 seeds.

Not prolific, very early, maturing its crop rather slowly.

No. 39. KENTISH INVICTA. (Thor. 1882.)

Synonym. *East's Kentish Invicta*. (Vil.)

Plant two and a half to three feet high; foliage slightly glaucous; stipules washed with white; stem sometimes branched at the base, rarely above; nodes rarely more than three inches apart; peduncles one to two (rarely three) inches long; pods slightly paler than the foliage, usually single, two to two and a half inches long, one-half of an inch wide, blunt at the apex when fully developed; peas four to six in a pod, whitish green, scarcely compressed, three-eighths of an inch in diameter; seeds dull green, shading in some specimens to cream color, nearly round, smooth, about five-sixteenths of an inch in diameter, radical distinct. An ounce contained 122 seeds.

Rather prolific, very early, maturing its crop gradually.

New in England in 1870. (Gar. Chron.)

No. 40. PRIZE TAKER. (Hen. 1882.)

Synonyms. *Prizetaker*, *Green Marrow*, *Bellamy's Early Green Marrow*, *Leicester Defiance*, *Rising Sun* (Vil.); *Noble's Green Marrow*, *Beck's Prizetaker*. (Gar. Chron.)

Plant three to five feet high; leaflets and stipules rather large, stipules slightly glaucous, washed with white; stem slender or medium, sometimes branched at the base and above; nodes rarely more than four inches apart; peduncles one to three and a half inches long; pods same color as the foliage, usually single, two and a half to three inches long, five-eighths of an inch wide, very blunt at the apex when fully developed; peas five to eight, rarely eleven in a pod, pale green, much compressed when full grown, flattened, nearly one-half of an inch in longest diameter; seeds dull yellowish green, shading in specimens to cream color, nearly round, about five-sixteenths of an inch in diameter, radical rather distinct. An ounce contained 117 seeds.

Very prolific, medium in season, the pods maturing very gradually.

Known in England prior to 1850. (Gar. Chron.)

§§ *Pods more or less recurved.*

No. 41. WILLIAM THE FIRST. (Thor. 1882).

Synonyms. -*Laxton's William the First*; (Fr.) *Pois à grain rond vert*, *Pois William* (Vil.).

Plant three to four feet high; foliage light green or medium; stipules much washed with white; stem slender, often branched at the base, rarely above; nodes rarely exceeding four inches apart; peduncles one-half of an inch to three inches long, rather slender; pods same color as the foliage, usually single, very glaucous, sometimes straight, two and a half to three and a half inches long, about one-half of an inch wide, tapering gradually to apex; peas four to seven in a pod, pale green, slightly compressed when full grown, about three-eighths of an inch in longest diameter; seeds dull yellowish green or cream colored, roundish, somewhat indented, about five-sixteenths of an inch in diameter, radical rather distinct. An ounce contained 127 seeds.

Moderately prolific, rather early, maturing its crop very gradually.

New in England in 1868. (Gar. Chron.).

No. 42. WHITE SABRE. (Vil.).

Synonyms. *White Cimeter*; (Fr.) *Pois d'Auvergne*, *Pois serpette*, *P. cosaque*, *P. crochu*. (Vil.).

Plant about three feet high; foliage medium, not glaucous; stipules scarcely washed with white; stem medium to large, rarely branched; nodes rarely more than four inches apart; peduncles one-half of an inch to two inches long; pods paler than the foliage, very often in pairs, two to three and half inches long, one-half of an inch wide, tapering very gradually to the apex, plump, very well filled; peas five to eight in a pod, whitish green, roundish, scarcely compressed even when full grown, three-eighths of an inch in diameter; seeds mostly cream-colored, very smooth, about one-fourth of an inch in diameter, radical distinct. An ounce contained 106 seeds.

Not very prolific, medium in season, maturing its crop promptly.

A very old variety.

No. 43. POIS DE CLAMART. (Vil.).

Synonym. *Pois carré fin* (Vil.).

Plant three to three and a half feet high; foliage medium; leaflets and stipules small, stipule glaucous, scarcely washed with white; stem medium to large, sometimes branched at the base and above; nodes rarely more than three inches apart; peduncles rarely more than half of an inch long; pods paler than the foliage, very often in pairs, plump, rounding gradually to the apex, two to two and a half inches long, one-half of an inch wide; peas four to six in a pod, whitish green, slightly oval, compressed when full grown, three-eighths of an inch in diameter; seeds almost all cream-colored, somewhat squared, one-fourth to three-eighths of an inch in diameter, radical rather distinct. An ounce contained seventy-nine seeds.

Not prolific, medium in season, maturing its crop promptly.

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No. 44. FILLBASKET. (Greg. 1883.)

Synonym. *Laxton's Fillbasket*. (Vil.)

Plant two to three feet high; foliage light-green, leaflets rather scanty, narrow, much undulated on the borders, especially toward the top of the plant; stipules washed with white; stem strong, often branched at the base and above; nodes rarely more than two inches apart; peduncles one and a half to two inches long; pods same color as the foliage, usually single, three to three and a half inches long, five-eighths of an inch wide, tapering very gradually to the apex; peas six to eight in a pod; pale-green, compressed when full grown, three-eighths of an inch in diameter; seeds pale-green, shading in some specimens to cream-color, roundish, slightly shrivelled, varying much in size, the larger ones about one-fourth of an inch in diameter, radical obscure. An ounce contained 148 seeds.

Productive, medium in season, maturing its crop rather promptly.

Introduced about 1872. A claimed cross between Laxton's Standard and Supreme. (Gar. Chron.)

No. 45. BLUE IMPERIAL. (Thor. 1882.)

Synonyms. *Dwarf Blue Imperial*; *Dwarf Green Imperial* (Haxton); *Large Blue Imperial*, *Dwarf Imperial*, *New Improved Imperial*, *New Long Podded Imperial*, *Green Nonpareil*, *Sumatra*, *Dwarf Blue Prolific*, *Blue Scymetar*, *Sabre*, *Blue Sabre*, *New Sabre*, *Dwarf Sabre* (Gar. Chron.); *Pois nain vert Imperial*, *P. bleu a courte tige*, *P. vert nain champêtre de seconde saison*, *P. à la reine* (Vil.)

Plant two and a half to four feet high; foliage deep-green, slightly glaucous, scarcely washed with white; stem strong, often branched at the base and above; nodes rarely more than two inches apart; peduncles one to two inches long; pods paler than the foliage, often in pairs, two to three inches long, five-eighths of an inch wide, rounding gradually to the apex; peas three to six in a pod, whitish-green, slightly oblong, flattened, one-half inch in longest diameter; seeds dull bluish green, shading in some specimens to cream-color, or almost white, oblong, much flattened, three-eighths of an inch in longest diameter, radical very distinct. An ounce contained sixty-five seeds.

Very prolific, late, maturing its crop rather promptly.

This is a very old variety and was offered by Mr. Thorburn in 1828. "It is very hardy, yields abundantly, thrives well in almost any description of soil or situation, and though not so sweet and tender as some of the more recent sorts, is of good quality. It vegetates with much greater certainty, and its crops are more reliable than the higher flavored varieties." (Burr's Gar. Veg.)

No. 46. DWARF BLUE PRUSSIAN. (Vil.)

Synonyms. *Blue Prussian*, *Royal Prussian Blue*, *Prussian Prolific*, *Green Prussian*, *Fine Long Podded Dwarf*, *Early Dutch Green*. (Gar. Chron.)

Plant two to three feet high; foliage deep green; stipules glaucous, scarcely washed with white; stem rather stocky, often branched at the base, rarely above; nodes rarely more than two inches apart; peduncles one half inch to two and a half inches long; pods slightly paler than the foliage, very often in pairs, sometimes straight, but usually slightly recurved, two to three inches long, one-half inch wide, plump, rounding rather gradually to the apex; peas four to six in a pod, slightly oblong, whitish-green, slightly compressed when full grown, about seven-sixteenths of an inch in longest diameter; seeds greenish-white, with blotches of very dull pale-green, somewhat indented, nearly three-eighths of an inch in diameter, radical rather distinct. An ounce contained seventy-seven seeds.

Moderately prolific, late, maturing its crop very slowly.

Offered by Thorburn in 1828.

No. 47. BLUE PRUSSIAN.

Plant three to four feet high; foliage rather pale-green, very slightly glaucous; stem medium or large, sometimes branched at the base and above; nodes rarely exceeding three inches apart; peduncles one-half inch to one and a half inches long; pods slightly paler than the foliage, often in pairs, sometimes straight, usually slightly recurved, plump, two to three inches long, five-eighths of an inch wide, very blunt at the apex when fully developed; peas four to eight in a pod, whitish-green, roundish or slightly oblong, much compressed when full grown, about seven-sixteenths of an inch in longest diameter; seeds greenish-white, with blotches of very dull pale-green, somewhat indented, nearly three-eighths of an inch in diameter, radical rather distinct. An ounce contained ninety seeds.

Not prolific, very late, maturing its crop very slowly.

Though generally considered as a field variety, this is sometimes grown as a garden pea. "It is unquestionably the parent of the Blue Imperial and all like varieties," and possibly also of the Knight's Marrows. Known in England prior to 1828.

No. 48. GREEN NOYAU (Vil.)

Plant two to three feet high; foliage deep-green; stipules glaucous, washed with white; stem rather stocky, angular, much branched at the base, often above; nodes rarely exceeding two inches apart; peduncles one-fourth an inch to two inches long; pods paler than the foliage, very often in pairs, rounding very gradually to the apex, though often rather blunt when fully developed, two to three inches long, rather more than half an inch wide, very plump; peas five to nine in a pod, whitish-green, oblong, compressed when full grown, about seven-sixteenths of an inch in longest diameter; seeds very dull pale-green, sometimes bluish-green, shading in spots to almost white, occasionally cream-colored, slightly oblong, scarcely indented, about three-eighths of an inch in diameter, radical very distinct. An ounce contained ninety-six seeds.

Very productive, and very late, maturing its crop gradually.

†† *Seeds decidedly shrivelled.*

§ *Pods straight or nearly so.*

No. 49. ALPHA. (Thor. 1882.)

Synonyms. *Laxton's Alpha*, *Early Alpha*, *Extra Early Alpha* (Fr.) *Pois à grain ridé vert*. (Vil.)

Plant two and a half to three feet high; foliage light green, rather scanty; stipules much, and leaflets slightly washed with white; stem slender, sometimes branched at the base; nodes rarely more than four inches apart; peduncles one to three inches long; pods paler than the foliage, usually single, two to three inches long, one-half to five-eighths of an inch wide, blunt at the apex when fully developed; peas four to six in a pod, whitish green, compressed when full grown, about three-eighths of an inch in longest diameter; seeds whitish green or cream colored, much shrivelled, nearly three-eighths of an inch in longest diameter; radical obscure. An ounce contained 124 seeds.

Not very prolific, very early, maturing its crop very promptly.

Introduced in 1867. Obtained from a claimed cross between Laxton's Long Pod and Advancer. (Gar. Chron.)

No. 50. BLISS' EVERBEARING. (Hen.)

Plant about two feet high; foliage deep green; stipules slightly glaucous, much, and leaflets slightly washed or spotted with white; stem stocky, often branched at the base and above; nodes rarely more than two inches apart, peduncles one-half inch to two inches long, strong; pods decidedly paler than the foliage, as often single as in pairs, sometimes slightly recurved, two to three inches long, one-half to five-eighths of an inch wide, often not well filled, usually slightly depressed between the peas, apex not very blunt; peas three to six in a pod, very large, whitish green, ovate, somewhat compressed, one-half inch in longest diameter; seeds slightly oblong, very much flattened and shrivelled, nearly one-half inch in longest diameter, radical rather distinct. An ounce contained sixty-nine seeds.

Not very prolific, medium in season, maturing its crop very promptly.

Introduced in 1884 by Messrs. B. K. Bliss & Sons.

No. 51. CRITERION. (Vil.)

Synonyms. *Standish's Criterion* (Fr.), *Criterion* (Vil.)

Plant about three feet high; foliage medium; stipules much and leaflets slightly washed with white; stem rather large, sometimes branched at the base and above; nodes rarely more than four inches apart; peduncles one-half inch to two and a half inches long; pods scarcely paler than the foliage, often in pairs, two to three inches long, one-half inch wide, plump, rounding to the apex when fully developed; peas four to eight in a pod, pale green, oval, compressed when full grown, one-half inch in longest diameter; seeds mostly cream colored, much shrivelled, three-eighths of an inch in longest diameter, radical obscure. An ounce contained eighty seeds.

Not very prolific, medium in season, maturing its crop rather promptly.

No. 52. WILSON (Vil.)

Synonym. *G. F. Wilson pea* (Vil.)

Plant two to three feet high; foliage deep green; stipules usually neither glaucous nor washed with white; stem stocky, angular, sometimes branched at the base and above; nodes rarely more than three inches apart; peduncles one-half inch to two and a half inches long; pods scarcely paler than the foliage, usually in pairs, sometimes slightly recurved, often poorly filled, two to three inches long, five eighths of an inch wide, rounding gradually to the apex, plump when well filled; peas four to seven in a pod, whitish green, oblong, sometimes compressed when full grown, rather more than one-half inch in longest diameter; seeds mostly cream colored, occasionally pale bluish green, flattened, much shrivelled, fully three-eighths of an inch in longest diameter, radical obscure. An ounce contained seventy-one seeds.

Rather prolific, late, maturing its crop very gradually.

No. 53. YORKSHIRE HERO. (Sib. 1883.)

Synonyms. *Turner's Wonderful*, *Carter's Prince of Wales*, *Carter's Princess of Wales*, *McLean's Favorite*. (Gar. Chron.)

Plant two to three feet high; foliage abundant, deep green; stipules somewhat glaucous, usually washed with white; stem often branched at the base and above; nodes rarely more than two inches apart; peduncles one and a half to two inches long; pods paler than the foliage, often in pairs, two and a half to three inches long, about five-eighths of an inch wide, not very well filled, tapering gradually to the apex; peas three to five in a pod, whitish green, slightly flattened, one-half inch in longest diameter; seeds pale green, shading to nearly white, very much shrivelled, flattened, fully three-eighths of an inch in longest diameter, radical obscure. An ounce contained seventy seeds.

Very prolific, late, maturing its crop rather promptly.

No. 54. LITTLE WONDER. (Fer. 1883.)

Synonym. *Carter's Little Wonder*.

Plant two to three feet high; stipules slightly glaucous; stem branched at the base, rarely above; nodes rarely more than two inches apart; peduncles two to four inches long; pods paler than the foliage, frequently in pairs, three to four inches long, three-fourths of an inch wide, rather blunt at the apex when fully developed; peas four to seven in a pod, ovate, whitish green, compressed when full grown, fully one-half inch in longest diameter; seeds pale green, bluish white or cream colored, much flattened and shrivelled, three-eighths of an inch in longest diameter, radical not very distinct. An ounce contained seventy-nine seeds.

Very prolific and very late, maturing its crop very gradually.

Introduced into this country about 1878.

No. 55. OMEGA. (Hen. 1883.)

Synonym. *Laxton's Omega*.

Plant two to three feet high; foliage rather abundant, deep green, with whitish veins; stipules glaucous; stem strong, often branched at the base, rarely above; nodes rarely more than two inches apart; peduncles one inch to one and a half inches long; pods frequently in pairs, same color as the foliage, three to three and a half inches long, three-fourths of an inch wide, thin in proportion to the width, rather blunt at the apex when fully developed, the point bending inward, forming a hook; peas four to eight in a pod, light green, somewhat compressed when full grown, about three-eighths of an inch in diameter; seeds pale green, shading in some specimens to almost white, flattened, much shrivelled, three-eighths of an inch in longest diameter, radical obscure. An ounce contained 126 seeds.

Very prolific and very late, maturing its crop rather promptly.

Known in England prior to 1872. (Gar. Chron.)

§§ *Pods more or less recurved.*

No. 56. DOCTOR McLEAN. (Greg. 1882.)

Synonym. *Turner's Doctor McLean.*

Plant two and a half to four feet high; foliage ample, deep green, glaucous; stipules slightly washed with white; stem often branched at the base and above; nodes rarely more than three inches apart; peduncles one to two inches long; pods paler than the foliage, usually in pairs, three to four inches long, about three-fourths of an inch wide, not plumply filled, tapering gradually to the apex; peas four to eight in a pod, whitish green, somewhat flattened, one-half of an inch in longest diameter; seeds pale, yellowish green, shading to nearly white, very much shrivelled, three-eighths of an inch in longest diameter, radical obscure. An ounce contained 94 seeds.

Very prolific, medium in season, maturing its crop very gradually.

No. 57. MARKET GARDEN. (Hors. 1883.)

Synonym. *Horsford's Market Garden.*

Plant about two feet high; foliage deep green; stipules glaucous, washed with white; stem very strong, usually branched at the base and above; nodes rarely more than two inches apart; peduncles one-half of an inch to two inches long, strong; pods paler than the foliage, usually in pairs, sometimes straight, two to three inches long, one-half of an inch wide, very plump, blunt at the apex when fully developed; peas four to six in a pod, roundish or very slightly oblong, whitish, much compressed when full grown, three-eighths of an inch in diameter; seeds pale green, shading, in specimens, to almost white, flattened, very much shrivelled, about five-sixteenths of an inch in diameter, radical obscure. An ounce contained 127 seeds.

Very prolific, medium in season, maturing its crop gradually.

Originated, in 1879, with Mr. F. H. Horsford, of Charlotte, Vermont, from a claimed cross between the Early Alpha and American Wonder.

No. 58. THE RACKET. (Hors. 1883.)

Plant two and a half to three feet high; foliage scanty, not glaucous; stipules and some leaflets washed with white, stipules usually waved; stem sometimes branched at the base, rarely above; nodes rarely exceeding four inches apart; peduncles one to three inches long, slender; pods paler than the foliage, usually single, sometimes straight, two and a half to three inches long, one-half of an inch wide, very blunt at the apex when fully developed; peas three to seven in a pod, pale green, much compressed, nearly one-half of an inch in longest diameter; seeds pale green or creamy white, much shrivelled and hollowed at the sides, about five-sixteenths of an inch in diameter, radical obscure. An ounce contained 107 seeds.

Productive, medium in season, maturing its crop very gradually.

Originated, in 1879, with Mr. F. H. Horsford, of Charlotte, Vt., from a claimed cross between Early Alpha and American Wonder. This variety and the Market Garden were produced in the same pod.

No. 59. JOHN BULL. (Greg. 1883.)

Plant two to three feet high; foliage ample, deep green; stipules glaucous, scarcely washed with white; stem strong, often branched at the base and above; nodes rarely more than two and a half inches apart; peduncles two to three inches long; pods paler than the foliage, often in pairs, three to four and a half inches long, about three-fourths of an inch wide, rounding gradually to the apex; peas four to eight in a pod, whitish green, ovate, flattened, not compressed, one-half of an inch in longest diameter; seeds shading from pale, yellowish green to creamy white, flattened, very much shrivelled, three-eighths of an inch in longest diameter, radical obscure. An ounce contained seventy-nine seeds.

Moderately prolific, very late, maturing its crop gradually.

No. 60. McLEAN'S BEST OF ALL. (Vil.)

Plant two to three feet high; foliage deep green; stipules glaucous, scarcely washed with white; stem stocky, often branched at the base and above; nodes rarely more than two inches apart; peduncles three-fourths of an inch to one and a half inches long, strong; pods slightly paler than the foliage, often in pairs, slightly recurved, two to three inches long, five-eighths of an inch wide, rounding gradually to the apex, rather plump; peas four to six in a pod, whitish green, oblong, compressed when fully grown, one-half of an inch in longest diameter; seeds cream color, shading, in some specimens, to very pale green, much shrivelled, fully three-eighths of an inch in longest diameter, radical obscure. An ounce contained seventy-two seeds.

Prolific, very late, maturing its crop rather slowly.

Introduced in 1871. Originated with Dr. McLean of Chelchester, Eng. (Gar. Chron.)

CLASS C. *Dwarf.* Plant not exceeding two feet in height under average conditions,

* *Seeds cream colored or white.*

† *Seeds smooth or but slightly indented.*

§ *Pods straight or nearly so.*

No. 61. FERRY'S EXTRA EARLY. (Fer. 1883.)

Plant one and a half to two feet high; foliage light green, not glaucous, stipules washed with white; stem very slender, sometimes branched at the base, rarely above; nodes rarely more than three inches apart; peduncles one-half inch to two inches long; pods paler than the foliage, usually single, two to two and a half inches long, five-eighths of an inch wide, very blunt at the apex when fully developed; peas five to seven in a pod, pale green, nearly round, slightly compressed when full grown, three-eighths of an inch in diameter; seeds sometimes shading towards green, very smooth, about one-fourth inch in diameter, radical obscure. An ounce contained 119 seeds.

Not very prolific, very early, maturing its crop promptly.

No. 62. TOM THUMB. (? 1882).

Synonyms. *Extra Early Dwarf Tom Thumb*; *Bush Pea*, *Beck's Gem* (Burr); *Sutton's Long Podded Tom Thumb*, *Beck's Early Gem*, (Fr.) *Pois nain hâtif extra*. (G&R Chron.)

Plant one and a half to two feet high; foliage abundant, very compact, rather deep green, neither glaucous or washed with white, leaflets smaller toward the top of the plant; stem strong, much branched; nodes rarely more than two inches apart; peduncles one to two inches long; pods paler than the foliage, often in pairs, two to two and a half inches long, one-half inch wide, blunt at the apex when fully developed; peas four to six in a pod, whitish green, compressed when full grown, three-eighths of an inch in longest diameter; seeds roundish, very smooth, about one-fourth of an inch in diameter, radical distinct. An ounce contained 117 seeds.

Prolific, rather early, maturing its crop remarkably slowly.

Certain strains of this very distinct variety are more dwarf than the height noted above.

Introduced into this country about the year 1850 by the Messrs. Landreth of Philadelphia. It succeeds best on heavy soil, and is largely used for fall planting in the south.

No. 63. VERY EARLY DWARF. (Vil.)

Probably the *Pois nain très hâtif à châssis* of Vil.

Plant about one foot high; foliage medium, terminal leaflets very small; leaflets and stipules scarcely glaucous, more or less washed with white; stem rather stocky, seldom branched, nodes rarely more than two inches apart; peduncles one-half of an inch to one and a half inches long, one-half of an inch wide, straight, rather blunt at the apex when fully developed; peas three to seven in a pod, pale green, roundish, compressed in fully developed pods, three-eighths of an inch in diameter; seeds roundish, very smooth, one-fourth of an inch in diameter, radical very distinct. An ounce contained 124 seeds.

Not very prolific, rather early, maturing its crop rather slowly.

No. 64. EARLY DWARF. (Vil.)

Synonyms. *Pois nain hâtif* ; *Pois L'Evergne*. (Gar. Chron.)

Plant one to two feet high ; foliage dark green ; stipules long in proportion to width, glaucous, slightly washed with white ; stem stocky, often branched at the base and above ; nodes rarely more than two and a half inches apart ; peduncles one-half inch to two and a half inches long ; pods paler than the foliage, very often in pairs, sometimes slightly recurved, rarely more than two inches long, one-half of an inch wide, plump, rather blunt at the apex when fully developed ; peas three to six in a pod, whitish green, very slightly oblong, somewhat compressed when full grown, about seven-sixteenths of an inch in longest diameter ; seeds roundish, very smooth, one-fourth inch in diameter, radical distinct. An ounce contained ninety-four seeds.

Prolific, medium in season, maturing its crop promptly.

Described in *Le Bon Jardinier* in 1818.

No. 65. VERY DWARF COUTOURIER. (Vil.)

Plant eight to twelve inches high ; foliage very deep green, leaflets remarkably small ; stipules glaucous, not usually washed with white ; stem stocky, sometimes branched at the base ; nodes rarely exceeding one and a half inches apart ; peduncles one half of an inch to one and a half inches long ; pods paler than the foliage, rarely single, sometimes recurved, very blunt at the apex when fully developed, one inch to two inches long, scarcely half an inch wide, very plump ; peas four to six in a pod, almost white, roundish, much compressed when full grown ; seeds round, very smooth, scarcely one fourth of an inch in diameter, radical very distinct. An ounce contained 133 seeds.

Moderately prolific, medium in season, maturing its crop gradually.

No. 66. VERY DWARF BRETAGNE. (Vil.)

Synonym. (Fr.) *Pois nain de Keroulas*. (Vil.)

Plant about one foot high ; foliage very deep green, leaflets remarkably small ; stipules glaucous, washed with white ; stem stocky, sometimes branched at the base and above ; nodes rarely exceeding two inches apart ; peduncles one-half to one and a fourth inches long ; pods scarcely paler than the foliage, almost always in pairs, sometimes slightly recurved, rather plump, one and a half to two inches long, scarcely half an inch wide, rounding rather gradually to the apex ; peas four to six in a pod, almost white, roundish, slightly compressed when full grown ; seeds very small, round, very smooth, about three-sixteenths of an inch in diameter, radical very distinct. An ounce contained 118 seeds.

Very prolific, considering the size of the plant quite late, maturing its crop in a remarkably short time.

†† *Seeds decidedly shrivelled.*

§ *Pods straight or nearly so.*

No. 67. MINIMUM. (Greg. 1883.)

Synonym. *Laxton's Minimum*.

Plant about six inches high; foliage pale green; stipules slightly glaucous; stem sometimes branched; nodes rarely more than an inch apart; peduncles one fourth to one inch long; pods paler than the foliage, usually single, one and a half to two inches long, one half inch wide, blunt at the apex when fully developed; peas three to six in a pod, pale green, compressed when full grown, three-eighths of an inch in diameter; seeds creamy white, very much shrivelled, about one fourth of an inch in diameter, radical very distinct. An ounce contained 181 seeds.

Prolific, considering the extreme dwarfness, rather early, maturing its crop very promptly.

No. 68. KNIGHT'S DWARF MARROW. (Vil.)

Plant about one and a half feet high; foliage medium; stipules slightly glaucous, much, and leaflets slightly washed with white; stem stocky, rarely branched; nodes rarely more than two inches apart; peduncles one inch to two inches long; pods very often in pairs, paler than the foliage, straight, or slightly recurved, two to three inches long, five-eighths of an inch wide, rounding very gradually to the apex; peas three to five in a pod, whitish-green, oval, compressed when full grown, one-half inch in longest diameter; seeds much flattened and shrivelled, three-eighths of an inch in longest diameter, radical rather distinct. An ounce contained eighty-eight seeds.

Not very prolific, medium in season, maturing its crop promptly.

One of the varieties originated by Thomas Andrew Knight at Downton Castle, England, between 1823 and 1828. It was offered by Thorburn in 1828.

****** *Seeds green, bluish-green, green and cream-colored, or bluish-green and cream-colored.*

† *Seeds smooth, or but slightly indented*

§ *Pods straight or nearly so.*

No. 69. BLUE PETER. (Thor. 1882.)

Synonyms. *McLean's Blue Peter*; *Blue Tom Thumb*. (?)

Plant ten to sixteen inches in height; foliage very deep green, glaucous, leaves towards the top of the stem much reduced in size, with the leaflets closer together, foliage slightly washed with white; stem sometimes branched both at the base and above; nodes very close; peduncles one-half inch to two inches long; pods paler than the foliage, often in pairs, two to three inches long, five-eighths of an inch wide, very blunt at the apex when fully developed; peas six to eight in a pod, whitish-green, ovate, flattened, compressed when full grown, about five-sixteenths of an inch in diameter; seeds dull green, bluish-white, or cream-colored, very slightly shrivelled, about five-sixteenths of an inch in diameter, radical distinct. An ounce contained 118 seeds.

Moderately prolific, very early, maturing its crop very promptly.

Known in England prior to 1872. (Gar. Chron.)

No. 70. DWARF GREEN ST. MICHAEL. (Vil.)

Plant one to two feet high ; foliage very dark green, slightly glaucous, leaflets small, rather elongated ; stipules very glaucous, washed with white ; stem rather stocky, often branched at the base, sometimes above ; nodes rarely more than two inches apart ; peduncles one-half inch to two inches long ; pods paler than the foliage, very often in pairs, sometimes slightly recurved, two to two and a half inches long, one-half inch wide, plump, rather blunt at the apex when fully developed ; peas four to seven in a pod, whitish-green, very slightly oblong, somewhat compressed when fully grown, about seven-sixteenths of an inch in longest diameter ; seeds pale olive-green, shading to greenish-white or cream-color, scarcely indented, nearly three-eighths of an inch in diameter, radical distinct. An ounce contained eighty-one seeds.

Moderately prolific, rather late, maturing its crop promptly.

No. 71. SUPPLANTER. (Greg.)

Synonym. *Laxton's Supplanter*.

Plant one and a half to two feet high ; foliage dark green, leaflets small towards the top of the plant ; stipules glaucous, washed with white, often wavy ; stem stocky, often branched at the base, sometimes above ; nodes rarely more than three inches apart ; peduncles one to two inches long, rather strong ; pods same color as foliage, very often in pairs, sometimes slightly recurved, rather blunt at the apex when fully developed, two to three inches long, five-eighths of an inch wide, plump, often poorly filled ; peas three to five in a pod, pale-green, slightly oblong, one-half inch in longest diameter, compressed when full grown ; seeds pale bluish-green, or cream-colored, sometimes shrivelled, flattened, three-eighths of an inch in longest diameter, radical rather obscure. An ounce contained eighty seeds.

Moderately prolific, rather late, maturing its crop promptly.

Introduced about the year 1872, by Mr. Laxton of Stamford, England. A claimed cross between Veitch's Perfection and Little Gem. (Gar. Chron.)

†† *Seeds decidedly shrivelled.*

§ *Pods straight or nearly so.*

No. 72. AMERICAN WONDER. (Bliss, 1882.)

Synonyms. *Bliss' American Wonder* ; (Fr.) *Pois Merveille d'Amérique*. (Vil.)

Plant six to ten inches high ; foliage deep-green, scarcely washed with white ; stem stocky, often branched at the base ; nodes remarkably close ; peduncles about one-half inch long ; pods paler than the foliage, usually single, two to two and three-fourths inches long, one-half inch wide, blunt at the apex when fully developed ; peas four to eight in a pod, flattened, whitish-green, nearly one-half inch in longest diameter ; seeds pale-green, shading in places to creamy-white, very much shrivelled, nearly three-eighths of an inch in longest diameter, radical rather distinct. An ounce contained 110 seeds.

Very prolific for the size of the plant, and very early, maturing its crop very promptly.

This is one of the earliest wrinkled peas known at the present time and is of superior quality. It originated with Mr. Charles Arnold of Canada, about the year 1878, from a claimed cross between Champion of England and McLean's Little Gem.

No. 73. PREMIUM GEM. (? 1882.)

Synonyms. *Carter's Premium Gem, Extra Early Premium Gem.*

Plant one to two feet high; foliage deep-green, scarcely glaucous, washed with white; stem sometimes branched at the base; nodes rarely more than one inch apart; peduncles one-fourth of an inch to three inches long; pods paler than the foliage, usually single, two to three inches long, one-half to five-eighths of an inch wide, blunt at the apex when fully developed; peas three to seven in a pod, oblong, much compressed, one-half inch in diameter; seeds pale green, shading in some specimens to creamy white, much shrivelled, flattened, nearly three-eighths of an inch in longest diameter, radical rather obscure. An ounce contained 108 seeds.

Very prolific for the size of the plant, rather early, maturing its crop very promptly.

No. 74. VERY DWARF WRINKLED. (Vil.)

Synonym. *Pois ridé très nain à bordures.* (Vil.)

Plant about one foot high; foliage medium, scarcely glaucous, leaflets and stipules more or less washed with white; stem sometimes branched at the base, often above; nodes rarely more than three inches apart; peduncles one-fourth to three-fourths of an inch long, rarely longer; pods paler than the foliage, rarely in pairs, one and a half to two and a half inches long, one-half inch wide, extremely plump, rather blunt at the apex when fully developed; peas three to seven in a pod, whitish-green, oblong, much compressed in fully developed pods, about one-half inch in longest diameter; seeds mostly cream-colored, much flattened and shrivelled, nearly three-eighths of an inch in longest diameter, radical very obscure. An ounce contained ninety-four seed.

Rather prolific, considering the size of the plant, rather early, maturing its crop rather slowly.

No. 75. WILLIAM HURST. (Greg.)

Plant about eight inches high; foliage medium, terminal leaflets small; stipules glaucous, washed with white; stem medium, rarely branched; nodes rarely more than two inches apart; peduncles one-half inch to one and a half inches long; pods paler than the foliage, single, one and a half to two and a half inches long, one-half inch wide, often slightly recurved, tapering gradually to a point, plump; peas four to seven in a pod, pale-green, oval, thickest towards the hilum, much compressed, one-half inch in longest diameter; seeds much flattened and shrivelled, three-eighths of an inch in longest diameter, radical rather obscure. An ounce contained 106 seeds.

Very prolific, considering the height of the plant, rather early, maturing its crop rather slowly.

No. 76. KNIGHT'S DWARF GREEN MARROW. (Vil.)

Synonyms. *Hair's Dwarf Green Marrow*; *Hair's Dwarf Mammoth?* (Burr); (Fr.). *Pois ridé nain vert hâtif*, *P. Napoleon*, *P. Climax*. (Vil.)

Plant one to two feet high; foliage deep green; glaucous, slightly washed with white; stipules very glaucous; stem stocky, sometimes branched at the base, often above; nodes rarely more than two inches apart; peduncles half an inch to one and a half inches long, strong; pods paler than the foliage, usually in pairs, not very well filled, two to three inches long, five-eighths of an inch wide, very numerous, rounding gradually to the apex; peas rarely more than five in a pod, very large, whitish green, oblong, much compressed when full grown, rather more than half an inch in longest diameter; seeds pale green, shading to almost white, much flattened and shrivelled, nearly half an inch in longest diameter, radical obscure. An ounce contained sixty-four seeds.

Very prolific, medium in season, maturing its crop promptly.

Offered by Thorburn in 1828. One of the original Knight's Marrows, originated with Mr. Thomas Andrew Knight, at Downton Castle, England.

No. 77. LITTLE GEM. (? 1882.)

Synonym. *McLean's Little Gem*.

Plant one and a half to two feet high; foliage dark green; stipules slightly glaucous, washed with white; stem often branched at the base; nodes rarely more than two inches apart; peduncles one-half to one inch long; pods paler than the foliage, usually single, two to three inches long, about five-eighths of an inch wide, blunt at the apex when fully developed; peas three to eight in a pod, whitish-green, compressed when full grown, slightly oblong, flattened, about one-half inch in longest diameter; seeds mostly cream-colored, occasionally very pale bluish-green or creamy-white, much shrivelled, nearly three-eighths of an inch in diameter, radical not very distinct. An ounce contained 108 seeds.

Very prolific for the size of the plant, medium in season, maturing its crop very promptly.

Introduced about 1863. Originated with Dr. McLean, of Colchester, England. (Gar. Chron.)

No. 78. PRIDE OF THE MARKET. (Greg. 1883.)

Synonym. *Carter's Pride of the Market*.

Plant about one and a half feet high; foliage ample, glaucous; stem strong, often branched at the base and above; nodes rarely more than one inch apart; peduncles one inch to one and a half inches long; pods same color as the foliage, usually single, three to four inches long, three-fourths of an inch wide, tapering gradually

to the apex; peas four to eight in a pod, pale green, ovate, compressed about one-half inch in longest diameter; seeds dull green, shading in specimens to creamy white, somewhat shrivelled, fully three-eighths of an inch in longest diameter. An ounce contained seventy-two seeds.

Moderately prolific, medium in season, maturing its crop rather gradually.

No. 79. STRATAGEM. (Sib. 1883.)

Synonym. *Carter's Stratagem*.

Plant about one and a half feet high; foliage rather abundant, remarkably compact toward the top of the stem, more or less waved and twisted, deep green, washed with white towards the base of the plant; stem remarkably strong, angular, often branched above, rarely below; nodes rarely exceeding two inches apart, very close towards the top of the plant; peduncles one-half inch to two inches long, very strong; pods same color as the foliage, usually single, often somewhat irregular in shape, two and a half to four inches long, three-fourths to seven-eighths of an inch wide, rounding very gradually to the apex; peas four to nine in a pod, very pale green, slightly oblong, much compressed when full grown, about one-half inch in longest diameter; seeds pale green, shading in specimens to creamy white, much flattened and shrivelled, fully three-eighths of an inch in longest diameter. An ounce contained eighty-one seeds.

Originated with Carter & Co., England. The Telephone is said to be one parent. The other is not known. (Rural New Yorker.)

§§ *Pods more or less recurved.*

No. 80. McLEAN'S DWARF PROLIFIC. (Lan.)

Plant one and a half to two feet high; foliage dark green, glaucous, more or less washed with white; stem stocky, sometimes branched at the base, often above; nodes rarely more than two inches apart; peduncles one-half to two inches long, pods paler than the foliage, usually in pairs, two to two and a half inches long, one-half inch wide, very plump, rather blunt at the apex when fully developed; peas four to seven in a pod, pale green, slightly oblong, much compressed when full grown, nearly half an inch in longest diameter; seeds pale green or cream-colored, much shrivelled, nearly three-eighths of an inch in diameter, radical rather obscure. An ounce contained 108 seeds.

Moderately prolific, rather late, maturing its crop promptly.

Originated with Dr. McLean of Colchester, England, prior to 1865. (Gar. Chron.)

CLASSIFICATION OF THE VARIETIES OF *P. * MACROCARPON*, THE EDIBLE PODDED PEA.

As the varieties of *P.*macrocarpon* are not numerous, we are able to make their classification more simple than those of *P.*sativum*. We divide the varieties first according to the height

of the plant; and second according to the color of the flowers and seeds.

Analytical Key.

CLASS A. Plant tall, exceeding four feet in height under average conditions.

* Seeds cream-colored. Three varieties described, Nos. 81–83, inclusive. Type, Tall. Edible Podded.

** Seeds dark colored or mottled, flowers colored. Two varieties described, Nos. 84–85. Type, Giant. Edible Podded.

CLASS B. Plant Half Dwarf, two to four feet high under average conditions.

* Seeds cream-colored. Three varieties described, Nos. 86–88, inclusive. Type, Dwarf White. Edible Podded.

** Seeds dark colored or mottled, flowers colored. One variety described, No. 89. Dwarf Gray. Edible Podded.

CLASS C. Dwarf. Plant not exceeding two feet in height under average conditions.

* Seeds cream-colored. Four varieties described, Nos. 90–93, inclusive. Type, Dwarf Royal. Edible Podded

DESCRIPTION OF THE VARIETIES OF P.*MACROCARPON.

CLASS A. *Plant tall, exceeding four feet in height under average conditions.*

* *Seeds cream-colored.*

NO. 81. LARGE WHITE EDIBLE PODDED. (Vil.)

Synonym. *Large White Podded Sugar.*

Plant three to five feet high; foliage light-green; leaflets and stipules often very large, more or less washed with white; stem very large, often one-fourth of an inch in diameter; sometimes branched at the base, often above; nodes sometimes five inches or more apart; peduncles one-half inch to two inches long; pods remarkably light-colored, single, bent and contorted, sometimes inflated, but usually closely pressed about the peas, three to five inches long, about one inch wide, rounding more or less gradually to the apex, tender and crisp, but less sweet than in some other varieties; peas five to six in a pod, greenish-yellow, slightly flattened by pressure from the pod, but not compressed, nearly half an inch in longest diameter; seeds dull cream-color, slightly oblong, very smooth, nearly three-eighths of an inch in longest diameter, radical distinct. An ounce contained eighty-six seeds.

Not very prolific, medium in season, maturing its crop promptly.

NO. 82. WRINKLED EDIBLE PODDED. (Thor. 1882.)

Synonym. *Wrinkled Sugar.*

Plant five feet or more in height; foliage abundant, not glaucous; stipules slightly washed with white; stem strong, much branched at the base and above; nodes sometimes five inches apart; peduncles two to four inches long; pods paler than the foliage, often in pairs, two to four inches long, about one-half inch wide, rather blunt at

the apex when fully developed; peas six to eight in a pod, oblong, whitish-green, compressed when full grown, nearly one-half of an inch in longest diameter; seeds pale yellowish green, shading in specimens to creamy white, somewhat shrivelled, about one-fourth of an inch in diameter, radical obscure. An ounce contained 103 seeds.

Extremely prolific, late, maturing its crop very gradually.

No. 83. TALL EDIBLE PODDED. (Thor. 1882.)

Synonym. *Tall Sugar*.

Plant five feet or more in height; foliage very ample; stipules slightly glaucous, washed with white; stem strong, often branched at the base and above; nodes rarely more than five inches apart; peduncles two to three inches long; pods usually single, two to three inches long, about one-half inch wide, blunt at the apex when fully developed; peas six to eight in a pod, pale green, slightly oblong, much compressed when full grown, nearly one-half inch in longest diameter; seeds yellowish-green or cream-colored, slightly indented, about five-sixteenths of an inch in diameter, radical very distinct. An ounce contained ninety-eight seeds.

Extremely prolific, late, maturing its crop very promptly.

**** Seeds dark colored or mottled, flowers colored.**

No. 84. GIANT EDIBLE PODDED. (Vil.)

Synonyms. *Giant Very Large Poddied Sugar*; (Fr.) *Pois géant sans parchemin*, *P. Bisalto d'Espagne*, *P. d'Alger*; (Ger.) *Kapuziner Erbse*, *Riesen Kapuziner E.* (Vil.)

Plant four to six feet high; foliage pale green; stipules and petioles of leaflets circled with deep red at their union with the stem or petiole; stem more or less washed with longitudinal streaks of deep red; leaflets and stipules large, the latter washed with white; stem large but slender in proportion to its length, often branched above, rarely at the base; nodes sometimes five inches apart; peduncles one to two inches long; pods single, remarkably distinct, often exceeding five inches in length, one and a half inches wide, much bent and contorted, often concave on one side and convex on the other, not at all filled by the peas, the two sides usually adhering closely, and much depressed between the peas, very pale green, wax-like in appearance, rounding more or less abruptly to the apex, entirely without parchment, crisp and sweet when at edible stage; peas five to eight in a pod, flattened by the side of the pod, pale green, scarcely in contact, rather more than half of an inch in diameter, nearly half of an inch thick; pods often poorly filled; seeds pale salmon color, shading to greenish, finely mottled with black, decidedly flattened, indented, fully three-eighths of an inch in diameter, radical obscure. An ounce contained sixty-five seeds:

Not prolific, rather late, maturing its crop promptly.

Mentioned in Gar. Chron. prior to 1850.

No. 85. TALL GRAY EDIBLE PODDED. (Thor. 1882.)

Synonym. *Tall Gray Sugar*.

Plant five feet or more in height; foliage ample, light green;

stipules much washed with white; stem strong, often one-fourth of an inch in diameter, often branched at the base and above; nodes rarely more than four inches apart; peduncles one to three inches long; pods often irregular and contorted, usually recurved, inflated, three to four inches long, three-fourths of an inch wide, roundish, scarcely in contact, three-eighths of an inch in diameter; seeds varying in color from dull reddish-brown to dull greenish-yellow, more or less dotted with minute brownish-black specks, roundish, scarcely indented, about one-fourth of an inch in diameter, radical invisible. An ounce contained 101 seeds.

Moderately prolific, late, maturing its crop very gradually.

CLASS B. *Half Dwarf*. Plants two to four feet high under average conditions.

* Seeds cream-colored.

No. 86. EXTRA EARLY DWARF BRETON. (Vil.)

Synonym. *Extra Early Dwarf Brittany*. (Vil.)

Plant about two feet high; foliage dark green; stipules slightly glaucous, somewhat washed with white; stem medium to large, often branched at the base and above; nodes rarely more than one inch apart; peduncles one-half of an inch to one and a half inches long; pods paler than the foliage, usually in pairs, loment-like, usually more or less recurved, often twisted and contorted, one and a half to three inches long, one-half of an inch wide, rounding very gradually to the apex; peas three to eight in a pod, flattened by pressure from the pod, whitish-green, in contact but not crowded, three-eighths of an inch in diameter; seeds nearly round, very smooth, about one fourth of an inch in diameter, radical distinct. An ounce contained 114 seeds.

Prolific, medium in season, maturing its crop very promptly.

No. 87. EDIBLE PODDED BUTTER. (Vil.)

Synonym. *Pois beurre*. (Vil.)

Plant about two and a half feet high; foliage medium, not glaucous; stipules not washed with white; stem medium to large, rarely branched; nodes rarely more than four inches apart; peduncles one-half of an inch to two and a half inches long; pods paler than the foliage, very often in pairs, very much recurved, two and a half to three and a half inches long measured on a line from base to tip, tapering very gradually to the apex; peas three to six in a pod, flattened by pressure from the pod, whitish-green, not compressed, three-eighths of an inch or more in diameter; seeds nearly round, smooth, nearly three-eighths of an inch in diameter, radical distinct. An ounce contained eighty-four seeds.

Not prolific, rather early, maturing its crop slowly.

The sides of the pod are one-eighth of an inch thick, and are very succulent, sweet and tender.

No. 88. DWARF WHITE EDIBLE PODDED. (Sib. 1883.)

Synonym. *Dwarf White Sugar*.

Plant four to six feet high; stipules slightly glaucous, usually washed with white; stem often branched at the base and above; nodes sometimes six inches apart; peduncles two to three and a half inches long; pods paler than the foliage, often in pairs, two and a half to three inches long, about one half of an inch wide, blunt at the apex when fully developed; peas six to eight in a pod, roundish, pale green, compressed when full grown, three-eighths of an inch in diameter; seeds rich cream color shading toward white, roundish, smooth, one-fourth of an inch in diameter, radical very distinct. An ounce contained 126 seeds.

Very prolific, medium in season, maturing its crop gradually.

**** Seeds dark-colored or mottled, flowers colored.**

No. 89. DWARF GRAY EDIBLE PODDED. (Thor. 1882.)

Synonym. *Dwarf Gray Sugar*.

Plant two to three feet high; foliage rather abundant, not glaucous, leaflets and tendrils rather small; stipules much washed with white; stem often branched at the base and above; nodes rarely more than two inches apart; peduncles one and a half to two inches long, flowers rather small; pods frequently in pairs, recurved, loment-like, often contorted, tapering very gradually to the apex; peas six to nine in a pod, pale, yellowish-green, roundish, not compressed, one-fourth to three-eighths of an inch in diameter; seeds light brown or pale green, speckled with small black dots, about one-fourth of an inch in diameter, radical invisible. An ounce contained 156 seeds.

Very prolific, medium in season, maturing its crop promptly.

CLASS C. *Dwarf*. Plant not exceeding two feet high under average conditions.

*** Seeds cream-colored.**

No. 90. DWARF ROYAL EDIBLE POD. (Vil.)

Plant about fifteen inches high; foliage deep green; stipules glaucous, washed with white; stem rather stocky, often branched at the base; nodes rarely more than two inches apart; peduncles one-half to two and a half inches long; pods much paler than the foliage, usually in pairs, loment-like, rarely more than two inches long, scarcely one-half inch wide, not very blunt at the apex, often somewhat recurved; peas three to six in a pod, whitish-green, roundish, slightly compressed when fully developed, scarcely three-eighths of an inch in diameter; seeds round, very smooth, about three-sixteenths of an inch in diameter, radical very distinct. An ounce contained 143 seeds.

Moderately prolific, medium in season, maturing its crop very promptly.

No. 91. DWARF CAPUCHIN. (Vil.)

Plant one to two feet high; foliage deep green, leaflets small; stipules very glaucous, scarcely washed with white; stem often branched at the base and above; nodes rarely more than two inches apart; peduncles one-half inch to two inches long; pods loment-like, scarcely paler than the foliage, rather strongly recurved, two to three inches long, one-half inch wide, rounding very gradually to the apex; peas four to seven in a pod, whitish-green, roundish, in contact but not compressed, about three-eighths of an inch in diameter; seeds rich cream-color, sometimes faintly tinged with green, roundish, very smooth, about one-fourth of an inch in diameter, radical distinct. An ounce contained 112 seeds.

Prolific, rather late, maturing its crop promptly.

No. 92. EDIBLE PODDED DWARF. (Vil.)

Plant one to two feet high; foliage deep green, leaflets small; stipules very glaucous, washed with white; stem often branched at the base, rarely above; nodes rarely more than two inches apart; peduncles one-half to one inch long; pods paler than the foliage, usually in pairs, sometimes slightly recurved, two to two and a half inches long, one-half inch wide, plump, blunt at the apex when fully developed, not loment-like; peas four to seven in a pod, greenish-white, roundish, somewhat compressed when full grown, about seven-sixteenths of an inch in diameter; seeds rich cream-color, shading in spots to almost white, roundish, very smooth, about five sixteenths of an inch in diameter, radical very distinct. An ounce contained ninety-nine seeds.

Moderately prolific, rather late, maturing its crop very promptly.

No 93. VERY EARLY DWARF. (*Sans Parchemin.*) Vil

Synonyms. *Dwarf Dutch*; *Dwarf Crooked Sugar*; (Fr.) *Pois sans parchemin très nain hâtif à châtis*. (Vil.)

Plant six to eight inches high; foliage deep green; stipules slightly glaucous, scarcely washed with white, terminal leaflets very small; stem stocky, usually branched at the base, rarely above; nodes rarely more than an inch apart; peduncles one-half to one inch long; pods paler than the foliage, very often in pairs, loment-like, two and a half to three inches long, one-half inch wide, not quite filled by the peas; peas often abortive, three to six in a pod, whitish green, roundish, slightly compressed when full grown, about five-sixteenths of an inch in diameter; seeds nearly smooth, slightly flattened, about one-fourth of an inch in diameter, radical very distinct. An ounce contained 102 seeds.

Very prolific for the size of the plant, rather early, maturing its crop promptly.

DESCRIPTION OF THE VARIETIES OF *P.* ARVENSE*, THE FIELD PEA.

The varieties of *P.* arvense* known in this country are so few as to need no classification. We, therefore, arrange the varieties in alphabetical order.

No. 94. EARLY CROWN. (Fer.)

Plant three and a half to five feet high; foliage medium; stipules very slightly glaucous, much and leaflets slightly washed with white; stem often branched at the base and above; nodes rarely exceeding three inches apart; peduncles one-fourth to one inch long; pods paler than the foliage, very often in pairs, recurved, blunt at the apex when fully developed, two to three inches long, scarcely half an inch wide, plump; seeds four to eighth in a pod, deep cream color, round, entirely smooth, about one-fourth of an inch in diameter, radical very distinct. An ounce contained 134 seeds.

Prolific.

No. 95. GRAY WINTER. (Vil.)

Plant about two and a half feet high; foliage medium; stipules very slightly glaucous, much and leaflets slightly washed with white; stem medium, rarely branched; nodes rarely more than four inches apart; peduncles one to four inches long; pods single, apparently never in pairs, paler than the foliage, straight, two to three and a half inches long, one-half inch wide, plump at the apex when fully developed; seeds dull pale green, shading in samples to pale dull red, slightly shrivelled, about three-eighths of an inch in diameter, radical distinct. An ounce contained 85 seeds.

Rather prolific.

No. 96. GOLDEN VINE. (Fer.)

Plant four to six feet high; foliage medium; stipules slightly glaucous, washed with white; stem medium to large, often branched above; nodes often four inches apart; peduncles one-fourth to three inches long; pods paler than the foliage, very often in pairs, blunt at the apex when fully developed, two to two and a half inches long, scarcely one-half inch wide, plump; seeds four to six in a pod, rich cream color, the shade varying in different samples, sometimes faintly tinged green, about three-sixteenths of an inch in diameter, radical distinct. An ounce contained 152 seeds.

Prolific.

No. 97. GOLDEN DROP. (Fer.)

Plant five feet or more in height; foliage not glaucous, slightly washed with white, leaflets rather small; stem comparatively slender often branched at the base and above; nodes rarely more than three inches apart; peduncles one-half to one inch long; pods paler than the foliage, very often in pairs, two to two and a half inches long, one-half inch wide, straight, plump very blunt at the apex when fully developed; seeds three to seven in a pod, beautiful variegated between golden yellow, olive green, and creamy white, roundish, scarcely indented, about one-fourth of an inch in diameter, radical very distinct. An ounce contained 131 seeds.

Moderately prolific.

No. 98. MAPLE. (Vil.)

Synonyms. *Partridge*; *Marlborough*; (Fr.) *Pois perdrix*. Vil.

Plant three to five feet high; foliage deep green; stem medium

or slender, often branched at the base and above; nodes rarely exceeding three and a half inches apart; peduncles one-half inch to one and a half inches long, slender; pods paler than the foliage, very often in pairs, sometimes slightly recurved, often very plump, two to three inches long, one-half inch wide, not very blunt at the apex; seeds four to seven in a pod, reddish brown, thickly mottled with greenish white, somewhat indented, averaging about one-fourth of an inch in diameter. An ounce contained 106 seeds.

Moderately prolific.

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SPINACH.

We planted seeds of seven so-called varieties in the garden April 26, in rows ten feet long and twenty-one inches apart, one row of

each. The soil was prepared as described for onions. We noted the following data:

	Per cent of vegetation.	First bloom in — days.	First ripe seed in — days.	Last ripe seed in — days.
Extra Large Prickly or Winter	53	54	100	108
Extra Large Round Leaved.....	61	55	80	130
Flanders.....	64	52	80	130
Large Dutch (round seed).....	55	52	80	108
Long Standing	55	66	100	136
Savory Leaved (round seed).....	63	52	99	100
Viroflay.....	70	52	106	103

The seeds of all the varieties vegetated in thirteen days from planting.

It appears that the Long Standing was, as its name implies, slowest in blooming. This variety seems very well adapted to spring sowing.

We noted that spinach sown in the fall not only made much larger growth than that sown in spring, but that it was later in running in seed.

We had much difficulty in describing the different varieties, as the variations are so great. Although a general difference was apparent between most of the plantings, we found it next to impossible to specify from the appearance of the plants in what this difference consisted.

Experiments.

In order to discover the influence of early and late matured seed upon the time of blooming in the resulting crop, we gathered in 1883 four samples of seed from each of six varieties of spinach. The selections made were 1st. The earliest ripened seed from one plant; 2d. The latest ripened seed from the same plant; 3d. The whole yield of seed of the plant that ripened earliest, and 4th. The whole yield of the plant that ripened latest. We planted one row of each of the four selections in the garden April 28.

The results show that the earliest ripened seed on the plant vegetated on the average forty per cent,* while the latest seed from the same plant vegetated twenty-two per cent. The plants grown from the latest seed bloomed on the average about two days later than those from the earliest seed.

The seed from the earliest ripened plant vegetated on the average forty-two per cent, while that from the latest plant vegetated forty per cent. The plants grown from the seed of the latest plant

* We here consider the seed cases of spinach as individual seeds.

bloomed on the average about three days later than those from the seed of the earliest plant.

Our experiments indicate that the earliest ripened seed on a plant gives a larger vegetation than the latest, but that the tendency in using the earliest seed is to shorten the period of usefulness of the plants.

There is much difference in the time of maturity of different plants, and of different seeds on the same plant in spinach. We noted that the later blossoms very often prove abortive. In the case of the Long Standing variety, several of the latest plants produced no seed, the flowers all proving abortive. It thus appears that there is a limit to the length of time that the blooming of the plants can be retarded by selecting the latest seed.

MISCELLANEOUS VEGETABLES, ETC.

Besides the vegetables already considered we grew several varieties each of endive, corn salad, cress, and chicory; with thirty species and varieties of the class of plants known to seedsmen a "herbs." We present the statistics gathered upon these plants in tabular form for purposes of reference. We have devoted less study to these plants than to the more generally known vegetables.

The plants of all the varieties of corn salad were early attacked by a fungus which largely prevented their maturity, and those of the cress were nearly destroyed by the flea beetle, in spite of repeated preventive applications. The plants of several of the varieties of endive were also prevented from complete maturity by a fungus attack.

ENDIVE.

	First vegetation in — days.	Fit for table use in — days.	First bloom in — days.	First ripe seed in — days.	Last ripe seed in — days.
Broad-leaved Batavian.....	8	54	96	155	....
Broad-leaved Winter.....	8	54	95	119	165
Ever White Curled.....	8	60	91	101	147
Fine Curled Picpus.....	8	60	88	101	147
Fine Curled Summer.....	8	60	89	101	147
Green Curled.....	8	53	83	106	165
Green Curled Ruffec.....	8	53	83	101	159
Green Curled Winter.....	8	53	93	124	....
Imperial Curled.. ..	8	53	91	131	158
Large Limay.....	8	53	97	101	....
Louviers Fine Laciniated.....	8	53	91	119	....
Moss Very Fine Curled.....	8	53	93	101	....
Round or Stag Horn	8	53	92	131	....
Very Fine Green Parisian Summer....	11	53	90	124	....
White or Lettuce-leaved.....	8	53	92	119	....

CORN SALAD.

	First veg- etation in — days	Fit for table use in—days.	First bloom in — days.	First ripe seed in — days.
Green Cabbaging.....	13	67	100	....
Green from Etampes.....	13	67	92	....
Italian	14	67	74	107
Large Round-leaved.....	13	67	82	....
Large Seeded Dutch Round-leaved,	12	67	....	....
Lettuce-leaved.....	12	67	82	107

CRESS.

	First vege tation in — days.	First bloom in — days.	First ripe seed in — days.
Broad-leaved Garden.....	7	....	....
Common or Plain.	7	44	113
Curled Garden.....	7	59	112
Dwarf Extra Fine Curled.....	7	48	111
Golden Yellow or Australian.....	7	72	....
Gray Seeded Early Winter or American..	7	....	....

CHICORY.

	First vege- tation in — days.	First bloom in — days.	No. of roots harves'd.	Average weight of roots, oz.
Common	8	86	68	2
Improved Very Large Leaved.....	8	96	52	1
Long Rooted Brunswick.....	8	....	61	4
Large Rooted Brussels or Whitloof.	12	96	36	4
Large Rooted Madgeburg.....	9	....	59	3

HERBS.

	First vegetation in — days.	First bloom in — days.	First ripe seed in — days	Last ripe seed in — days.
Anise.....	26	77	127	....
Basil — Anise Scented.....	22	73	127	....
Basil — Bush Green.....	22	73	127	....
Basil — Bush Purple.....	22	73	127	....
Basil — Curled.....	17	73	127	....
Basil — Large Green Sweet...	17	77	127	....
Basil — Large Purple.....	17	73	127	....
Basil — Lettuce Leaved	22	73	127	....
Basil — True	83	92	....	....

HERBS.

	First vegetation in — days.	First bloom in — days.	First ripe seed in — days.	Last ripe seed in — days.
Bene.....	28	73	.....	.....
Balm — (planted 1883).....	.	July 5	.....	.....
Burnet — Garden.....	18	.....	.....	.....
Borage.....	..	76	.....	.....
Chervil — Curled or Dutch ...	17	56	94	.....
Cummin.....	22	60	82	102
Caraway — (planted 1883) ....	..	May 17	June 24	Aug. 4
Fennel — Sweet.....	18	86	110	.....
Fennel — Bitter.....	23	86	106	.....
Horehound — (planted 1883)..	..	June 23	Aug. 4	... ..
Hyssop — (planted 1883).....	..	June 30	Aug. 4	Aug. 18
Marjoram — Sweet.....	25	.....	.....	.....
Rue — (planted 1883).....	..	June 16	Sept. 12	.....
Sage — <i>Salvia horminum pur-</i> <i>pureum</i>	16	56	99	.....
Sage — <i>Salvia horminum Vio-</i> <i>lette</i>	16	80	.....	.....
Sage — <i>Salvia Argentea</i>	16	.....	.....	.....
Sage — (planted 1883).....	..	June 6	June 30	.....
Sorrel — (planted 1883) ....	..	June 14	July 15	Aug. 17
Savory — Summer.....	18	73	108	.....
Thyme — Winter.....	25	.....	.....	.....
Thyme — French (planted 1883) ..	..	June 5	.....	.....

We also grew twenty-four so-called varieties of kale, four of kohl rabi, two of Brussels sprouts, and four of Cardoon. The Brussels sprouts headed very nicely. The varieties were called Improved Extra, and Dwarf Improved.

A plant that attracted considerable attention in the garden was the Florence fennel, or Finocchio, *Fœniculum dulce*. (De O.) The foliage of this plant resembles in appearance and taste that of the common Sweet fennel, but the base of the petioles which are opposite and lap over one another, is very broad and thick, forming a flattened, bulb-like expansion, about three inches in its longest diameter. This thickened part is the portion used. When boiled, it is tender, and has a flavor somewhat like that of celery, though more sweet and anise like. It is also sometimes eaten raw as a salad.

The plant is annual, is readily propagated from seed, and grew with much vigor in our garden. It bloomed early in August, but for some reason the flowers all proved abortive.

We succeeded in growing the Skirret the past season, by starting

the seeds in boxes in the hot-bed, and transplanting the plants to the garden when of sufficient size. We have made several attempts to grow this vegetable by planting in the open ground, but the seeds have in every case failed to vegetate.

Several samples of seed were received at the station from Teneriffe, from Prof. C. W. Dabney, of North Carolina, obtained through Mr. Lopez, U. S. Consul. Some of these failed to grow. Of those that vegetated were two varieties of Lentil (*Ervum*) one of Lupine, *Lupinus perennis*, two varieties of a "Chicaro," identified as *Lathyrus sativus*, and another leguminous plant not identified. The plants of all were interesting, as being unfamiliar, but none seemed to offer promise of being valuable in our climate.

SYNONYMS DETERMINED IN 1883 AND 1884.

In our report for 1883, our list of synonyms was erroneously printed. We, therefore, repeat the synonyms from that report (p. 223), adding those determined the past season. The synonyms are printed in italics. (?) attached to a synonym indicates that we desire further verification.

Beet, 1883.

Dark Red Egyptian. (Sib. 1883.) Synonym, *Eclipse*. (Thor. 1883) ?

Norbiton Giant Mangel. (Sib. 1883.) Synonym, *Mammoth Long Red Mangel*. (Sib. 1883.)

Long Red Mangel. (Sib. 1883.) Synonym, *Henderson's Colossal Long Red Mangel*. (Hen. 1883.)

Cabbage, 1883.

Schweinfurt. (Sib. 1883.) Synonym, *Largest White Schweinfurs*. (Ben. 1883.) *Schweinfurt Quintal*. (Greg. 1883.)

Quintal Drumhead. (Fer. 1883.) Synonym, *Strassburg Quintal*. (Ben. 1883.)

Carrot, 1883.

Early French Scarlet Forcing. (Sib. 1883.) Synonym, *Gartier's Red Horn* (?) (Ben. 1883.) *Extra Early Forcing* (grown in 1882.)

Carrot, 1884.

Danvers. (Fer. 1883.) Synonym, *Danver's Orange Half Long*. (Lan.)

Guerande. (Greg.) Synonym, *Guerande Half Long Stump Rooted*. (Vil.)

Orange Belgian. (Vil.) Synonym, *Large Yellow Belgian*. (Sib. 1883.)

Celery, 1884.

Red Giant Solid. (Vil.) Synonym, *Hood's Dwarf Red*. (Hen.)

Cucumber, 1884.

Peerless. (Thor.) Synonym, *Peerless White Spine*. (Greg.)

West India Gherkin. (Vil.) Synonym, *Small Green Pickling or Gherkin*. (Vil.)

Egg Plant, 1883.

Tomato-shaped Red. (Bliss, 1883.) Synonyms, *Tomato-formed Red* (Ben. 1883); *Scarlet Chinese*. (Thor. 1883).

Long White China. (Greg. 1883.) Synonym, *White Long Chinese*. (Vil. 1883.)

Lettuce, 1883.

All the Year Round. (Sib. 1883.) Synonyms, *Satisfaction Black Seeded* (Sib. 1883); *Salamander* (Hen. 1883).

Prize Head. (Sib. 1883.) Synonyms, *Ferry's Early Prize Head* (Fer. 1883); *American Gathering* (Sib. 1883).

Hardy Green Winter. (Thor. 1883.) Synonym, *Hammersmith Hardy Green*. (Bliss, 1883.)

Large Princess Head. (Greg. 1883.) Synonym, *French Imperial Head*. (Greg. 1883.)

Curled Simpson. (Batch. 1882.) Synonym, *Perpetual*. (Bliss, 1883.)

White Seeded Tennis Ball. (Sib. 1883.) Synonym, *White Forcing Head*. (Thor. 1883.)

White Cabbage. (Batch. 1882.) Synonym, *Large White Stone Summer*. (Sib. 1883.)

Lettuce, 1884.)

Black Seeded Butter. (Hen.) Synonym, *Bloomsdale Butter Black Seeded*. (Lan.)

Prize Head. (Sib.) Synonym, *American Curled*. (Vil.)

Dwarf Green Early (black seed). (Greg.) Synonym, *Very Early Dwarf Green*. (Vil.)

Early Curled Simpson. (Vil.) Synonym, *Murton's Perfection*. (Sib.)

Green Paris Cos. (Vil.) Synonym, *Landreth's Heat Resisting Cos*. (Lan.)

Hardy Red Winter. (Vil.) Synonym, *Red Winter Cabbage*. (Thor.)

Neapolitan. (Vil.) Synonyms, *Large Saint Angelo* (Dam.); *New Giant of Salerno* (Dam.)

White Cabbage. (Batch. 1882.) Synonym *Very Large Yellow Paresseuse*. (Dam.)

Large Green. (Vil.) Synonym, *Large Green Pas-de-Calais*. (Vil.?)

Crisp Small Early Frame. (Vil.) Synonym, *Crisp Small Early Cutting*. (Vil.)

Muskmelon, 1883.

Christiana. (Dr. Sturtevant, 1882.) Synonym, *Improved Orange Christiana*. (Thor. 1883.)

Muskmelon, 1884.

Jenny Lind. (Sib. 1883.) Synonym, *Jenny Lind Citron*. (Lan.)
 Surprise. (Sib. 1883.) Synonym, *New Surprise*. (? 1882.)

Parsnip, 1883.

Long Hollow Crown. (? 1882.) Synonyms, *Abbott's Hollow Crown* (Sib. 1883); *Sutton's Student* (Thor. 1883); *Guernsey or Cup* (Thor., 1883); *Carter's New Maltese* (Sib. 1883).

Turnip Rooted. (Ben. 1883.) Synonyms, *Round* (Thor. 1883); *Early Round or Turnip* (Greg. 1883.).

Pea, 1883.

Cleveland's First and Best. (Cleve., 1883.) Synonyms, *Ferry's First and Best* (Fer. 1883); *Sibley's First and Best* (Sib. 1883); *Thorburn's First and Best* (Thor. 1882); *Henderson's First of All* (Hen. 1883); *Hancock* (Greg. 1884); *Philadelphia Extra Early* (Thor. 1882).

Blue Imperial. (Thor. 1883.) Synonym, *Dwarf Blue Imperial*. (Sib. 1883.)

Premium Gem. (Fer. 1883.) Synonym, *Carter's Premium Gem* (Greg. 1883).

Pea, 1884.

Philadelphia Extra Early. (Thor. 1882.) Synonyms, *Cleveland's Rural New Yorker* (Rural New Yorker); *Dexter* (Greg.); *Landreth's Extra Early* (Lan.); *Thorburn's Extra Early Market* (Thor.); *Reedland* (Lan.)?

Express. (Greg.) Synonym, "No. 72" (Bliss).

Dwarf White Marrowfat. (Thor. 1882.) Synonyms, *Brown's New Early Dwarf Marrowfat* (Greg. 1883); *Royal Dwarf Marrowfat* (Greg. 1883).

Knight's Dwarf Green Marrow. (Vil.) Synonym, *Hair's Dwarf Green Marrow*. (Thor. 1882.)

Pepper, 1883.

Large Bell. (? 1882.) Synonyms, *Bull Nose* (? 1882); *Sweet Mountain or Mammoth* (? 1882).

Oxheart. (? 1882.) Synonym, *New Oxheart*. (Thor. 1883.)

Tomato-shaped. (? 1882.) Synonyms, *Squash* (? 1882); *Large Squash* (Thor. 1883).

Pepper, 1884.

Spanish Mammoth. (Vil.) Synonym, *Ruby King*. (B. M. & Co.)

Monstrous. (Vil.) Synonyms, *Spanish Mammoth* (Vil.) ?; *Sweet Spanish*. (Vil.)

Radish, 1883.

Scarlet Turnip Rooted. (? 1882.) Synonyms, *Early Scarlet or Red Turnip* (Sib. 1883); *Early Scarlet Turnip Rooted* (Fer. 1883).

Radish, 1884.

Early Deep Scarlet. (Vil.) Synonyms, *Earley Round Dark Red* (Hen.); *Deep Scarlet Turnip* (Thor.).

Early Scarlet Turnip. (Vil.) Synonym, *Early Scarlet or Red Turnip* (Sib. 1883).

Scarlet Turnip, white-tipped. (Vil.) Synonym, *Early Scarlet Turnip, with white tail.* (Thor.)

Golden Yellow Turnip. (Vil.) Synonym, *Yellow Summer Turnip.* (Thor.)

Giant Stuttgart Summer. (Thor.) Synonym, *Early White Giant Stuttgart.* (Vil.)

Squash, 1883.

Turban. (Sib. 1883.) Synonyms, *Low's Premium Hybrid* (1882)?; *Essex Hybrid* (Sib. 1883)?

Squash, 1884.

New White Pine Apple. (B. M. & Co.) Synonym, *Landreth's White Turban.* (Lan.)

Tomato, 1884.

Acme. (? 1882.) Synonym, *Essex Early Hybrid* (Sib. 1883).

Extra Early Red. (Sib. 1883.) Synonyms, *Early Red Smooth* (Thor. 1883); *Early Round Red Smooth* (Greg. 1883).

Great Chihuahua. (Greg. 1883). Synonym, *President Garfield.* (Sib. 1883.)

Broad-leaved Dwarf. (Thor. 1883.) Synonym, *Keyes' Early Prolific.* (Greg. 1883.)

THE NUMBER OF VARIETIES TESTED IN THE STATION GARDEN.

For convenience in reference, and as a matter of interest, we note the number of differently named samples of the various garden and farm products tested in the Station garden in the years 1883 and 1884. The list given includes the synonyms, but excludes plantings that failed to vegetate :

	1883.	1884.
Anise.....	..	1
Artichoke	1	..
Balm	1	1
Basil.....	1	8
Bean.....	218	25
Bean (Soya)	8	1
Beet (Chard).....	5	1
Beet (Garden).....	18	19
Beet (Mangel).....	8	13
Beet (Sugar).....	4	89
Boneset.....	..	1
Borage.....	1	1
Brocoli.....	3	10
Brussels Sprouts.....	2	2
Burnet.....	1	1

	1883.	1884.
Cabbage.....	51	52
Caraway.....	1	1
Cardoon.....	1	4
Carrot.....	22	32
Caterpillars.....	1	1
Cauliflower.....	22	20
Celeriac.....	2	7
Celery.....	18	10
Chervil.....	1	1
Chicaro.....	..	2
Chicory.....	..	5
Chick pea.....	1	3
Chinese Cabbage.....	2	2
Chives.....	1	..
Collards.....	1	1
Coriander.....	1	..
Corn Salad.....	1	6
Corn (Sweet).....	27	35
Corn, other than Sweet.....	101	96
Cow pea.....	19	6
Cress.....	3	6
Cucumber.....	22	24
Cummin.....	..	1
Dill.....	1	..
Egg Plant.....	17	..
Endive.....	3	15
Fennel, Bitter.....	..	1
Fennel, Florence.....	..	1
Fennel, Sweet.....	1	1
Garlic.....	1	..
Gobo.....	1	1
Gourd.....	13	6
Horehound.....	1	1
Horseradish.....	1	1
Hyssop.....	1	1
Kale.....	25	24
Kohl Rabi.....	3	4
Leek.....	2	7
Lettuce.....	60	110
Lentils.....	..	2
Lupine.....	..	1
Martynia.....	2	..
Melon (Musk).....	39	39
Melon (Water).....	29	9
Morelle.....	1	1
Mustard.....	3	..
Okra.....	3	1
Onagre.....	1	..
Onion.....	36	30

	1883.	1884.
Orach	2	1
Parsley.....	5	2
Parsnip	9	3
Pea	68	109
Peanut.....	1	..
Pepper.....	21	10
Physalis.....	3	1
Pot marigold.....	..	1
Potato.....	91	134
Potato (wild).....	1	2
Pumpkin.....	7	6
Radish.....	24	59
Raphanus caudatus.....	..	1
Roquette.....	1	..
Rue	1	1
Ruta Baga.....	16	7
Sage.. ..	1	7
Salsify	1	1
Savoy	10	12
Savory, Summer.....	..	1
Savory, Winter.....	..	1
Scolimus.....	1	..
Scorzonera.....	1	1
Shallot.....	1	..
Skirret.....	..	1
Sorghum.....	55	2
Sorrel.....	1	1
Spinach.....	8	17
Spinach, New Zealand.....	1	..
Squash.....	23	20
Sunflower	1	1
Sweet Marjoram.....	..	1
Thyme.....	..	2
Tobacco.....	26	28
Tomato.....	67	61
Turnip.....	42	58
Whitloof.....	1	..
Total.....	<u>1,303</u>	<u>1,216</u>

THE POTATO.

A Test of Varieties.

We tested in the garden the past season 132 so-called varieties of potato, of which eighty-five were tested last season. The remaining forty-seven had not been previously grown at the station.

The soil received a light dressing of stable manure before plowing, with a moderate application of superphosphate in the drill, just before planting. The seed was cut to single eyes, and the sections

placed a foot apart in shallow drills, three and a half feet apart and covered as nearly as practicable three inches deep. The plants when sufficiently large were hilled up with the hoe to a moderate height. No weeds were permitted to grow among them at any time, and the crop was harvested after the tops were dead.

The cuttings were planted in rows eleven feet long, two rows of each variety. Thus there were twenty-two hills of each (with a very few exceptions).

In the following table, however, the yield is calculated on the basis of 100 planted hills. That is to say, the Adirondac, of which two rows, each eleven feet long, were planted, would have yielded 127 pounds of potatoes had there been a row 100 feet long yielding at the same rate that the two short rows yielded:

POTATO.

NAME.	Date planted.	Date of first vegetation.	Date of first bloom.	Date when tops were dead.	Number of merchant-able tubers.	Weight of merchantable tubers.	Weight of unmerchant-able tubers.	Total weight of tubers.	Number of mal-formed tubers.
Adirondac.....	May	27	July 7	September 9	157	Lb. 40 Oz. 0 $\frac{1}{2}$	Lb. 86 Oz. 14 $\frac{1}{2}$	Lb. 126 Oz. 15	5
Almo.....	"	23	"	" 4	214	" 74 " 11	" 33 " 0 $\frac{1}{2}$	" 107 " 11 $\frac{1}{2}$	"
Alpha.....	"	23	"	August 14	43	" 4 " 15	" 20 " 1 $\frac{1}{2}$	" 25 " 0 $\frac{1}{2}$	14
American Giant.....	"	26	July 12	September 9	257	" 110 " 1 $\frac{1}{2}$	" 8 " 0 $\frac{1}{2}$	" 118 " 2	"
Andrus White Rose.....	"	23	"	September 17	186	" 41 " 11	" 47 " 4	" 88 " 15	5
Astonisher.....	"	26	"	" 17	166	" 46 " 6	" 8 " 10	" 54 " 11	"
Baker's Imperial.....	"	23	"	" 17	176	" 62 " 14	" 31 " 9	" 93 " 15	5
Beauty of Hebron.....	"	23	"	" 4	224	" 64 " 8	" 19 " 10	" 84 " 8	19
Beauty of Rochester.....	"	23	"	" 3	153	" 76 " 2	" 30 " 15	" 107 " 7	"
Belle.....	"	23	"	" 3	219	" 67 " 4	" 17 " 9	" 84 " 11	"
Big Benefit.....	"	26	"	" 2	257	" 59 " 16 $\frac{1}{2}$	" 45 " 10	" 104 " 14	"
Bliss' No. 12.....	"	27	July 11	August 26	166	" 50 " 11	" 37 " 14	" 88 " 13 $\frac{1}{2}$	"
Bliss' No. 30.....	"	26	" 5	September 2	190	" 56 " 11	" 18 " 2 $\frac{1}{2}$	" 74 " 13 $\frac{1}{2}$	"
Bliss' No. 39.....	"	26	"	August 16	110	" 20 " 6	" 14 " 9	" 34 " 14	"
Bliss' No. 51.....	"	26	"	September 11	171	" 46 " 2	" 37 " 3	" 83 " 6	5
Bliss' Triumph.....	"	27	"	August 16	286	" 69 " 12	" 19 " 5 $\frac{1}{2}$	" 89 " 1 $\frac{1}{2}$	5
Blush No. 2.....	"	26	"	September 17	200	" 38 " 15 $\frac{1}{2}$	" 21 " 7	" 60 " 6 $\frac{1}{2}$	"
Boston Market.....	"	26	July 29	September 17	276	" 97 " 11	" 25 " 12	" 123 " 7	43
Breese's Red.....	"	28	June 30	August 26	300	" 80 " 3	" 13 " 1	" 92 " 4	5
Breese's Advance.....	"	23	July 21	September 17	266	" 105 " 10 $\frac{1}{2}$	" 10 " 11 $\frac{1}{2}$	" 116 " 6	"
Brownell's Best.....	"	23	"	" 17	206	" 75 " 5	" 30 " 4 $\frac{1}{2}$	" 105 " 9 $\frac{1}{2}$	"
Cap Sheaf.....	"	26	" 14	August 18	190	" 49 " 2	" 23 " 10	" 71 " 12	"
Champion of America.....	"	26	July 17	September 26	176	" 59 " 1	" 10 " 15	" 70 " 0	"
Charter Oak.....	"	26	"	" 17	205	" 63 " 15 $\frac{1}{2}$	" 40 " 11	" 104 " 10 $\frac{1}{2}$	"
Chicago Market.....	"	23	"	" 17	176	" 62 " 8	" 21 " 3	" 83 " 10	10
Clark's No. 1.....	"	31	"	" 29	238	" 71 " 11 $\frac{1}{2}$	" 12 " 1 $\frac{1}{2}$	" 83 " 13	10
Collum's Big Benefit.....	"	31	"	" 8	239	" 70 " 11	" 18 " 5	" 89 " 0	14
Collum's Superb.....	"	26	" 21	" 29	281	" 82 " 13	" 11 " 5	" 94 " 2	10
Conqueror.....	"	2	" 21	" 17	176	" 48 " 3	" 14 " 2	" 62 " 5	10
Corless Matchless.....	June	23	" 2	" 17	314	" 99 " 14	" 15 " 12 $\frac{1}{2}$	" 115 " 10 $\frac{1}{2}$	"
Crandall's Seedling.....	May	29	July 5	" 4	176	" 43 " 4	" 20 " 6	" 63 " 16	"

Potato — (Continued).

NAME.	Date planted.	Date of first vegetation.	Date of first bloom.	Date when tops were dead.	Number of merchant-able tubers.	Weight of merchantable tubers.	Weight of unmerchant-able tubers.	Total weight of tubers.	Number of mal-formed tubers.
Dakota Red	May	May	July	September	210	Lb. 79	Lb. 10	Lb. 89	10
Defiance	"	June	"	"	186	60	41	101	10
Duchesse	"	"	"	"	50	6	6	12	10
Dunmore	"	"	"	"	290	110	20	131	5
Early Blush	"	May	"	"	278	71	30	101	5
Early Electric	"	"	"	"	163	54	12	67	5
Early Gem (Vick's)	"	"	July	"	214	70	16	87	24
Early Harvest	"	"	"	"	176	49	23	72	5
Early Household	"	"	"	"	114	27	19	46	5
Early Maine	"	"	"	August	219	71	21	92	24
Early Mayflower	"	"	"	September	310	69	30	99	24
Early Ohio	"	"	"	"	263	79	18	97	29
Early Rose	"	"	July	August	257	89	18	107	14
Early Snowflake	"	"	"	"	171	86	44	80	10
Early Sunrise	"	"	July	"	257	94	16	111	14
Early Telephone	"	"	"	"	303	63	54	117	19
Early Vermont	"	"	July	September	248	88	14	97	19
El Paso	"	June	"	August	9	1	8	9	10
English Champion	"	"	"	September	105	81	36	68	24
Exemus Rose	"	May	"	"	176	75	20	96	10
Farina	"	May	"	"	329	74	28	103	10
First and Best	"	June	July	"	114	32	13	45	14
Flesh Colored	"	"	"	"	81	21	11	33	14
Garnet Chill	"	"	"	"	114	41	7	49	14
General Hancock	"	May	July	"	157	56	17	74	10
German Red	"	"	"	"	248	93	21	114	10
Grange	"	"	"	"	191	64	11	76	10
Gipsy	"	"	"	"	57	23	10	33	5
Hall's Early Peachblow	"	"	July	"	183	43	14	58	5
House Comfort	"	"	"	"	183	43	14	58	5

10	24	6	...	24	29	6	...	28	61	...	6	6	10	6	29	...	29	19	24	31	48	29	10	28	29	43	14	19	23	10	14	...	14	...	19	...	14	9	...	6	14	...						
1	24	94	134	15	24	54	14	4	144	0	74	54	7	2	84	5	74	2	4	10	8	134	24	6	11	144	34	134	154	84	15	134	104	104	84	1	64	114	8	104	14	6	74	15	84					
66	75	75	26	105	73	83	64	6	140	103	73	73	119	66	104	84	40	100	70	103	123	61	157	134	83	81	140	18	141	99	117	66	136	136	104	84	104	163	163	165	141	73	139	139	111	65	129	69	83	
15	3	44	6	6	24	134	9	4	25	13	24	49	61	17	24	11	17	14	10	16	13	15	33	97	45	14	14	11	6	51	22	9	14	11	18	30	35	13	49	13	11	30	8	9	37	16	26	9		
9	164	5	74	30	6	7	5	...	104	6	34	15	124	14	4	104	74	154	...	13	10	2	10	7	1	1	94	74	1	104	54	114	1	18	4	8	64	124	114	13	114	4	1	14	13	14	84	4		
57	59	61	29	64	54	71	47	...	105	90	9	26	67	80	79	65	29	66	59	64	97	79	124	107	64	73	79	115	7	123	45	65	86	113	113	104	98	140	140	85	123	64	64	102	113	41	43			
131	195	190	95	245	145	299	145	...	295	288	48	148	130	193	294	214	114	299	205	215	295	175	393	293	314	219	200	399	38	913	215	267	297	293	324	297	299	400	300	943	319	271	300	393	297	293	295	157	210	
23	13	17	10	9	9	17	14	...	13	23	4	26	4	6	6	11	16	6	11	15	13	6	6	16	29	13	29	29	28	29	28	9	30	18	18	11	13	29	29	4	4	11	29	9	13	29	9	29	9	
August	September	August	September	August	September	August	September	August	September	August	September			
3	7	7	3	1	10	3	...	3	6	21	14	7	14	23	21	16	3		
26	27	2	23	29	29	27	27	13	26	26	29	24	27	27	20	27	27	27	27	26	26	26	26	26	26	26	26	2	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	
June	May	June	May	June	May
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
..

Potato — (Concluded).

NAME.	Date planted.	Date of first vegetation.	Date of first bloom.	Date when tops were dead.	Number of merchant-able tubers.	Weight of merchantable tubers.	Weight of unmerchant-able tubers.	Total weight of tubers.	Number of mal-formed tubers.
Steuben Beauty.....	May 4	May 27	July 12	August 26	280	Lb. 79 Oz. 9½	Lb. 8 Oz. 12½	Lb. 88 Oz. 6	10
Tennessee.....	" 4	" 26	" 3	September 9	319	116 1	27 8½	143 9½	23
Toga.....	" 4	" 23	" 21	" 11	263	120 13	14 4½	126 1½	28
Tremont.....	" 4	" 24	" 12	" 4	171	43 4	53 9	96 13	...
Tyrian Purple.....	" 4	" 24	" 14	August 23	210	36 7½	54 0	90 7½	...
Vermont Champion.....	" 4	" 23	" 10	" 19	95	18 2½	18 12	36 14½	...
Vick's Extra 'Early'.....	" 4	" 23	" 10	" 14	105	24 6½	27 3½	61 10	...
Vick's Prize.....	" 4	" 24	" 3	September 11	300	113 6	31 2	144 8	29
Vick's Surprise.....	" 4	" 24	" 3	" 6	271	101 5	27 10½	123 15½	29
Wall's Orange.....	" 4	" 26	" 7	" 11	257	77 10	17 12	110 6	5
Wald's Jumbo.....	" 4	" 26	" 3	" 13	317	105 15	17 4	123 3	5
White Chief.....	" 4	" 23	" 3	" 13	267	98 3½	23 4	126 7½	...
White Elephant.....	" 4	" 23	" 3	" 11	300	96 6	26 2	131 9	12
White Star.....	" 4	" 23	" 25	" 9	319	82 6	23 0	104 6	10
White Whipple.....	" 4	" 24	" 9	" 11	343	65 5	14 13½	79 2½	33
Whitney's No. 1.....	" 4	" 26	" 2	" 11	152	65 15	14 4½	80 3½	...
Willey's No. 10.....	" 4	" 27	" 3	" 29	19	4 10	9 9	14 8	5
Winslow Seedling.....	" 4	" 26	" 3	" 4	257	91 14	16 1	107 15	14
XX (Alexander).....	" 4	" 23	" 3	August 16	213	51 11	19 5	71 0	...
Seedling from O. H. Alexander.....	" 4	" 24	" 3	September 23	80	17 13	10 5	23 2	...
Seedling from E. L. Coy.....	" 15	June 4	July 5	September 29	275	95 5	19 7	114 12	20

It thus appears that Rose's Invincible gave the largest yield of merchantable tubers; President Arthur second, and Nott's Victor third. At the yield noted, the first produced at the rate of a little over 290 bushels of merchantable potatoes per acre; the second a little over 265 1-2 bushels; and the third slightly less than 260 bushels. In contrast with this the German Red, and Knapp's Snowbank produced no merchantable tubers at all.

Rose's Invincible gives also the largest total yield, or a little over 317 bushels per acre. It appears to the credit of this new variety that it produced but 27 bushels of unmerchantable tubers in a total (calculated) yield of 317 bushels.

A comparison of the yield of potatoes grown in 1883 with that of the past season shows a falling off of about thirty-five per cent in the latter. We were visited with a severe drought shortly after the planting, and a second during August, which may account for the light yield of the past season. We find, however, in comparing individual varieties, that the differences in yield are very far from uniform. Despite the smaller average yield of thirty-five per cent, for the crop of 1884, several varieties yielded larger in 1884 than in 1883.

Variations in different Trials with Potatoes.

In order to illustrate of how little value is a single test of a variety of potato, we present the following table giving the results of three plantings from the same stock of seed. The first is the Station yield of 1883, the second, the Station yield of 1884, and the third, the results obtained by Mr. Asher B. Evans, of Lockport, N. Y., with station seed.

All are calculated to the row of one hundred feet.

It will be observed that certain varieties give their maximum yield in each of the three columns.

POTATO.								
	STATION, 1883.		STATION, 1884.		EVANS, 1884.		AVERAGE.	
	Merchant- able.	Total yield.	Merchant- able.	Total yield.	Merchant- able.	Total yield.	Merchant- able.	Total yield.
Adirondac.....	151	187	40	127	119	124	101	146
Alpha	14	15	5	25	26	32	15	24
American Giant.....	178	203	110	118	140	142	123	154
Andrus' White Rose.	75	116	42	89	...	...	59	103
Astonisher.....	38	70	46	55	94	96	56	74
Baker's Imperial.....	113	166	62	94	117	142	94	134
Beauty of Hebron ...	150	207	65	85	86	92	101	125
Big Benefit.....	47	102	59	105	...	...	53	104
Bliss No. 12	90	134	51	89	66	83	69	102
Bliss No. 30	45	106	57	75	95	104	49	95

	STATION, 1883.		STATION, 1884.		EVANS, 1884.		AVERAGE.	
	Merchant- able.	Total yield.	Merchant- able.	Total yield.	Merchant- able.	Total yield.	Merchant- able.	Total yield.
Bliss No. 39	22	53	20	35	105	124	49	71
Bliss No. 51	43	90	46	83	91	102	60	92
Bliss Triumph	84	112	70	89	...	...	77	118
Boston Market.....	92	124	98	123	...	...	95	123
Breese's Red	118	152	80	92	123	131	107	125
Brownell's Best	88	134	75	106	...	...	84	120
Champion of America	104	108	49	72	117	125	90	102
Chicago Market.....	104	145	63	84	...	...	84	115
Clark's No. 1.....	134	170	72	84	115	116	107	123
Conqueror.....	103	142	48	62	98	104	83	103
Corless' Matchless ...	96	144	95	116	102	115	94	125
Crandall's Seedling ..	145	179	42	63	112	121	100	...
Defiance	137	201	60	102	102	116	100	140
Duchess.....	8	22	6	13	...	...	7	18
Dunmore.....	111	180	111	132	...	...	111	156
Early Electric.....	63	85	55	67	143	150	84	101
Early Gem (Vick's)..	71	104	71	102	...	...	71	103
Early Harvest.....	106	142	55	67	107	114	90	108
Early Household	37	70	27	46	46	56	37	57
Early Mayflower	96	140	70	100	...	...	83	120
Early Ohio	79	103	79	98	...	...	79	101
Early Rose	71	114	89	107	...	...	80	111
Early Snow-flake	88	135	36	81	85	96	70	71
Early Sunrise	90	123	95	111	70	83	85	106
Early Telephone	82	121	63	118	...	...	73	120
Early Vermont	81	124	83	97	78	79	81	100
English Champion...	81	114	32	69	130	139	81	106
Farina	80	117	74	104	124	133	93	115
First and Best	73	96	32	46	...	...	56	71
Flesh Colored.....	8	20	21	33	...	...	15	27
Garnet Chili.....	84	105	42	49	...	...	63	77
Grange	161	224	93	115	144	160	133	167
Gipsy	158	206	65	77	124	133	119	139
Intermediate	65	86	60	73	...	...	58	80
Invincible	107	159	61	76	...	...	84	118
James Vick	115	160	95	106	...	...	105	133
Jordan Prolific.....	39	71	71	83	...	...	55	77
Jumbo.....	72	119	47	65	...	...	60	92
Knapp's Snow Bank.	90	124	...	6	143	146	78	92
Late Beauty of Hebr'n	95	143	106	141	139	150	113	148
Long Pink Eye	8	27	9	33	...	...	9	30
Luxury	108	178	27	76	117	128	84	94
Magnum Bonum	125	142	68	119	..	...	98	131

	STATION, 1883.		STATION, 1884.		EVANS, 1884.		AVERAGE.	
	Merchant- able.	Total yield.	Merchant- able.	Total yield.	Merchant- able.	Total yield.	Merchant- able.	Total yield.
Mammoth Pearl.....	115	160	51	68	...	...	83	114
Manhattan	77	97	...	...	15	19	47	58
Marvel of Beauty.....	82	134	79	104	...	...	82	119
Mountain Rose.....	50	75	23	40	66	79	47	65
New Champion	130	160	86	100	83	86	100	115
New England Beauty.	149	170	60	70	64	69	91	103
Oneida Peachblow...	110	165	94	139	...	...	102	152
Pennsylvania Belle ..	151	175	80	92	73	75	101	114
Pride of America.....	56	91	49	100	...	...	56	96
Red Elephant.....	124	148	...	...	47	51	86	100
Rochester Favorite ..	141	169	112	124	147	150	133	148
Rocky Mountain Rose	88	124	106	137	...	...	97	132
Roger's No. 4.....	154	204	93	107	132	144	93	152
Roger's No. 7.....	139	186	111	146	122	128	111	153
Rose's New Seedling.	43	88	86	135	...	...	65	112
Rosy Morn.....	129	169	129	142	104	122	121	145
Rubicund	162	193	65	77	106	109	111	90
Rural Blush	154	180	109	140	171	175	145	165
Saint Patrick	128	158	121	129	...	...	125	144
Scottish Champion...	36	75	21	58	...	...	29	67
Seed f'm C. Baldrige	80	94	...	...	62	66	71	80
Steel's Red	96	131	43	58	...	...	70	92
Strong's Imperial.....	71	94	...	...	116	126	94	110
Tennessee	110	162	116	144	125	133	117	147
Tyrian Purple.....	65	106	36	90	91	98	64	95
Vermont Champion .	47	58	18	37	61	67	42	54
Vick's Prize.....	92	132	113	145	124	132	110	137
Wall's Orange	133	151	77	110	...	...	100	131
White Elephant.....	148	190	96	132	154	162	133	161
White Star.....	179	207	82	104	...	...	132	156
White Whipple	189	223	65	79	113	119	123	141
Willey's No. 10	96	114	5	14	...	...	52	64

Experiments with Tubers taken from Productive and Un-productive Hills.

It is a well asserted fact that almost all varieties of the potato rapidly degenerate in productiveness when grown under farm conditions. It has been suggested that possibly this decrease in prolificacy may be due, at least in a degree, to the fact that the majority of farmers are almost entirely careless in the matter of the selection of seed.

With the view of gathering evidence upon this subject, we selected in the fall of 1883, the most productive hill, and the least

productive hill respectively from ten of the varieties of potato in the Station garden.

On the 8th of May last, the largest and the smallest tuber respectively, from each of these selected hills were cut to single eyes, and planted in the garden, under the conditions noted for the list of varieties; the cuttings of each tuber forming a short row by themselves. Thus, there were four short rows of each of the ten varieties; viz., the first containing the cuttings of the largest tuber of the largest hill; the second, those of the smallest tuber of the largest hill; the third, those of the largest tuber of the smallest hill; and the fourth, those of the smallest tuber of the smallest hill.

The cultivation observed was the same as that already described for the list of varieties. When the tops were dead, the rows were dug, and the yield of merchantable and unmerchantable potatoes in each carefully weighed.

In order to avoid confusion in the use of terms, we will designate the tubers taken from the largest hill of each variety as A, and those from the smallest hill, as B, respectively.

We present the results obtained in tabular form, giving the number of eyes that vegetated from each tuber, and the yield of merchantable and unmerchantable tubers calculated *per eye*, in ounces as follows.

POTATO.							
			Yield.				
			No. of eyes planted.	No. vege- tated.	Un-		Total yield per eye, oz.
					Merchant-	merchant-	
			able tubers per eye, oz.	able tubers per eye, oz.			
<i>Adirondack :</i>							
A	— Largest tuber.....	7	7	14.68	1.82	16 50	
	— Smallest tuber....	6	6	10.67	2.08	12.75	
B	— Largest tuber.....	8	8	10.22	3.5	13.72	
	— Smallest tuber....	5	4	11.25	3.44	14.69	
<i>Beauty of Hebron :</i>							
A	— Largest tuber.....	9	9	10.00	3.83	13.83	
	— Smallest tuber....	8	7	12.79	4.07	16.86	
B	— Largest tuber.....	11	11	7.72	3.98	11.71	
	— Smallest tuber....	4	4	9.44	3.12	12.56	
<i>Conqueror :</i>							
A	— Largest tuber.....	8	7	14.96	1.51	16.53	
	— Smallest tuber....	6	5	10.40	2.1	12.50	
B	— Largest tuber.....	10	5	9.00	0.9	9.90	
	— Smallest tuber....	3	3	4.33	2.33	6.66	
<i>Crandall's Seedling :</i>							
A	— Largest tuber.....	11	11	8.95	2.34	11.29	
	— Smallest tuber....	9	9	10.33	1.28	11.61	
B	— Largest tuber.....	11	10	11.67	2.47	14.14	
	— Smallest tuber....	7	7	9.68	1.36	11.04	

	No. of eyes planted.	No. vege- tated.	Merchant- able tubers per eye, oz.	Un- merchant- able tubers per eye, oz.	Total yield per eye, oz.
<i>Defiance :</i>					
A — Largest tuber.....	11	11	14.91	6.00	20.91
— Smallest tuber....	3	3	9.25	4.83	14.08
B — Largest tuber.....	9	9	14.39	4.14	18.53
— Smallest tuber....	3	2	4.25	7.25	11.5
<i>Early Mayflower :</i>					
A — Largest tuber.....	11	11	8.70	8.29	16.99
— Smallest tuber....	10	10	8.68	4.8	13.48
B — Largest tuber.....	8	8	8.72	4.56	13.28
— Smallest tuber....	8	8	5.37	4.37	9.74
<i>Early Sunrise :</i>					
A — Largest tuber.....	11	11	17.55	2.18	19.73
— Smallest tuber....	7	7	13.14	3.14	16.28
B — Largest tuber.....	8	6	8.21	1.83	10.04
— Smallest tuber....	4	3	4.42	4.42	8.84
<i>English Champion :</i>					
A — Largest tuber.....	11	11	13.41	6.04	19.05
— Smallest tuber....	8	8	10.19	3.91	14.10
B — Only tuber.....	6	6	9.33	5.29	14.62
<i>Rural Blush :</i>					
A — Largest tuber.....	11	11	18.59	3.64	22.23
— Smallest tuber....	10	10	15.45	3.70	19.15
B — Largest tuber.....	11	11	16.36	3.32	19.68
— Smallest tuber....	10	10	8.40	4.25	12.65
<i>Wall's Orange :</i>					
A — Largest tuber.....	10	10	12.12	2.65	14.77
— Smallest tuber....	9	9	8.83	2.42	11.25
B — Largest tuber.....	11	11	8.83	2.68	11.51
— Smallest tuber....	7	7	8.25	3.43	11.68

In order to bring out more clearly the lessons suggested by these figures, we present them in other aspects.

Although being of different varieties, and not different plantings of the same variety, these plantings cannot in a strict sense be considered as duplicate experiments, yet such a treatment of them is not improper.

Calculating the yield per hundred eyes, and arranging the varieties in order of merchantable yield, omitting the English Champion, which is not entirely comparable, we have :

	A — Largest hill.				B — Smallest hill.			
	Largest tuber.		Smallest tuber.		Largest tuber.		Smallest tuber.	
	Merch.	Total	Merch.	Total	Merch.	Total	Merch.	Total
Rural Blush.....	116	138	96	119	102	123	52	79
Early Sunrise.....	109	123	82	102	51	62	27	55
Conqueror.....	94	103	65	78	56	62	27	42
Defiance.....	93	130	57	88	90	116	26	72
Adirondac.....	91	103	67	79	64	86	70	91
Wall's Orange....	75	92	55	70	55	72	51	73
Beauty of Hebron.	62	86	80	105	48	73	59	79
Crandall's Seedling	57	71	64	72	73	88	61	69
Early Mayflower..	54	106	54	84	54	83	34	61
	83.4	106	69	88	66	85	45	69

It appears that in the yields from the largest tubers the weight of the merchantable potatoes from A surpasses that from B in seven cases out of the nine ; and that in the smallest tubers, the weight of the merchantable potatoes from A surpasses that from B in eight cases out of nine.

It appears also that the weight of merchantable potatoes from the smallest tuber of A surpasses that from the largest tuber of B in four cases, with two cases of equal yield.

In the average, it appears :

First. That both the merchantable and the total yields from the A exceed those from B.

Second. That the product of the largest tuber from A exceeds that of the largest tuber from B, both in the merchantable and total yield.

Third. That the product of the smallest tuber from A exceeds that of the smallest tuber from B, both in merchantable and total yield.

Fourth. That the product of the smallest tuber from A exceeds that of the largest tuber from B, both in merchantable and total yield.

Fifth. That the largest tubers yielded more than the smallest ones.

The differences in yield appear very clearly when we arrange the figures in order of their magnitude. Thus, comparing the totals of the largest and the smallest tubers separately, we have :

Largest tuber.		Smallest tuber.	
Of largest hill.	Of smallest hill.	Of largest hill.	Of smallest hill.
138	123	119	91
130	116	105	79
123	88	102	79
106	86	88	73
103	83	84	72
103	73	79	69
92	72	78	61
86	62	72	55
71	62	70	42

The question may arise whether the smaller size of the cuttings from the smaller tubers may not account for the differences in yield. The smallest tubers planted in A, however, did not exceed in size the smallest tubers in B. Hence the results seem to indicate that the tubers of A possessed more inherent vigor than those of B. We have material for further experiments in this direction the coming season.

While we cannot regard a single experiment in this line as in any sense conclusive, the evidence seems so clearly in favor of using only tubers from the more productive hills of potato for seed, that we commend the subject to the consideration of potato growers who are inclined to make experiments. It would involve little extra labor in digging potatoes by hand to deposit the tubers from each hill by themselves, when a sufficient number of tubers to supply seed for the coming year could be easily gathered from the more productive hills.

The Decaying of Potatoes.

The potato disease did not appear at the Station the past season.

The tubers deposited in the cellar in the fall of 1883, which were infested with the disease when dug, continued to decay during the winter.

Lime has sometimes been recommended as a preventive of the potato rot. In order to test its efficacy, we filled two barrels with sound White Star potatoes, in the fall of 1883, in one of which we sprinkled air-slacked lime, as the tubers were put in, in sufficient quantity to whiten them.

On April 3rd the potatoes in both barrels were examined. The one treated with the lime contained sixty-eight decayed tubers, while the other contained but fifty-two. It thus appears that in this experiment the lime exerted no beneficial influence.

ROOT WASHINGS.

Strange to say the distribution of the roots of plants in the soil is a subject that has received comparatively little attention from agriculturists. It would seem that before we can give an intelligent opinion as to the best system of cultivation to be observed, or the best method of applying fertilizers for any crop, we should know something of the character of the roots that sustain the plants, and the position that these occupy in the soil. If the fibrous roots through which the plant receives its nourishment grow very near the surface, it is certain that any but the most shallow cultivation must lacerate these to a great extent. If on the other hand the fibrous roots chiefly lie deeper than the ordinary plow reaches, it may be advisable, in preparing the soil for such crops, to plow deeper than we usually do, and thus mellow and fertilize the soil at the point where the roots can be more directly benefited by culture and fertility.

The subject of the distribution of roots suggests questions that are as yet unanswered. How far do varying soils, seasons and cli-

mates influence the position or extent of the roots of plants? It may be that the results reached in the heavy clay soil of the station garden do not apply at all in a mucky or sandy soil. It may be that the results obtained here in a dry season would be quite different from those obtained in a wet one. It may be that the results secured in two entirely similar soils would be quite different if the climate of the two were widely different.

Does fertility or temperature have the greater influence in determining the position of the roots? If the former, then fertilizing the surface tends to entice the roots upward. If the latter, then fertilizing can be of benefit only so far as it reaches the feeding ground of the roots. It follows also that if the position of the root is determined by the temperature of the soil, that the roots of the same plant would lie deeper in a tropical than a temperate climate; and hence the same methods of culture would not apply equally well to both. Perhaps heredity exerts a stronger influence than either temperature or fertility. Of course the observations made the past season in the station garden concerning the distribution of roots, furnish us no data by which we are enabled to fully answer these questions. It is only preliminary work in what seems to be a most important and fertile field.

With the view of examining the root systems of our garden plants, we planted last spring, seeds of one or more varieties of most of the different vegetables, near the hydrants in the garden. By removing a part of the earth on one side of a plant of which we desired to examine the roots, and attaching a hose to one of the hydrants, we were able to wash out the roots easily and rapidly. In some cases, however, the tenacious character of the soil rendered it difficult or impossible to trace the finest roots to their termination. We should state here that the soil on which these vegetables were grown is a clay loam to the depth of six to ten inches, below which is a tenacious sub-soil of gravelly clay.

THE PEA.

July 25 we examined the roots of a plant of British Queen pea, of which the pods were just past the marketable stage. The plant was about four and a half feet high. The tap root extended nearly perpendicularly downward to the depth of thirty-nine inches. Below this it was too delicate to trace. Branches separated from the tap root throughout its length. These were most numerous between four and eight inches in depth, where they seemed to nearly fill the soil for a distance of about eight inches on either side. We traced a single branch root a distance of eighteen inches from the tap root. The majority of the branches appeared to extend little farther than a foot. They gradually became shorter as the depth increased, but were four to six inches long at a depth of thirty inches. Sometimes the branches curved upward after leaving the tap root. The latter for a depth of six inches below the surface was clothed with clusters

of a peculiar tubercular growth. This sometimes appeared upon the branches also, but never far from the tap root. We have frequently noticed this tubercular growth upon pea roots at other times, though we have very rarely seen it mentioned. Two German writers speak of it, one ascribing it to a fungus growth, and the other to bacteria. The subject is evidently little understood.

July 9 we examined the roots of a plant of American Wonder pea, of which the stem was six inches tall, with the pods just past the marketable stage. The roots extended almost exclusively downward, the tap root extending to a depth of thirty inches, with no branches extending more than four inches from it. It thus appears that the pea, like the clover, alfalfa and some other of the Leguminosae, is a deep rooting plant. We should expect, therefore, that where the straw is returned to the soil, peas would prove beneficial rather than exhaustive. The deeply penetrating roots doubtless draw much of their nourishment from a considerable depth, and hence would tend to enrich the surface. As the roots extend horizontally so short a distance, no objection appears for planting the rows of garden peas as near together as convenience in gathering will permit, provided that in the taller varieties the rows extend north and south so that the sun has opportunity to shine between them.

The deep-rooting character of the pea plant may explain the slight influence that fertilizers seem to have upon it, as we noted in detailing our experiments upon this vegetable.

It appears that while the root system of the Dwarf American Wonder pea is less extensive than that of the tall British Queen, yet the diminution of the extent of the roots in the former is by no means in proportion to that of the stem.

LETTUCE.

The roots of lettuce also run chiefly downward. July 9, we examined the roots of a plant of the Crisp Small Early Frame variety. The flower stalk had then commenced to form, being about six inches high. The tap root extended downward to the depth of more than twenty-five inches. Fibrous roots started out from this just below the surface of the ground, sloping downward at an angle of about forty-five degrees, but we were unable to trace these more than a foot from the tap root. The greater part of the fibrous roots lay within eighteen inches of the surface, and six inches on either side of the tap root.

We thus see that the roots of the lettuce plant at this stage of growth extend downward four times as far as the stem rises upward; although this proportion is doubtless very much changed after the flower stalk is fully formed. It appears also, that for the full development of the roots, the rows of lettuce should not be less than two feet apart. It is evident that where the plants are crowded in the bed, as we sometimes see lettuce grown, the root system must be correspondingly dwarfed.

ENDIVE.

The endive is also a deep-rooting plant. July 28, we examined the roots of a plant of the Broad Leaved Batavian variety that was forming the flower stalk. One of the leading roots, of which there were several, was traced to a depth of three feet, when it became too delicate to follow. The branches extend downward at an angle of about forty-five degrees, sending out fibers which grow mostly upward. We traced one of the longer branches a distance of eighteen inches, when its delicacy prevented following it further. Few of the fibers reached nearer the surface than six inches. The principal part of the fibrous roots lay between six and eighteen inches deep.

It appears that the root system of endive is somewhat more extensive than that of lettuce, and consequently the plants would seem to require more room. It would seem also that both these plants must act somewhat like the clover and pea, in recompensing to a certain degree their draft upon the soil, by bringing a part of their sustenance from a considerable depth.

SPINACH.

The root system of spinach is less extensive than that of endive, and does not extend so deeply into the soil. July 28 we examined the roots of a plant of the Prickly or Winter variety. The deepest growing root extended about two feet downward, and the longest horizontal roots reached about eighteen inches. The feeding roots seemed chiefly to lie at a depth of about six inches, though many fibrous roots rose upward to within two inches of the surface.

The root was a thickened tap root to the depth of four inches, below which, it divided into many branches of varying length and thickness.

It thus appears that the roots of spinach feed largely in the cultivated soil near the surface, which may account for the fact that it responds so freely to high manuring. As the roots extend a foot and a half on either side, it is obvious that the rows should not be closely crowded.

ASPARAGUS.

We are especially interested in examining the root system of asparagus, because the growers of this vegetable in the vicinity of Paris, who are notoriously successful, maintain that the roots of asparagus do not run deep where they have abundance of nourishment near the surface, and consequently that the custom so common in this country of trenching the soil for this crop is a useless waste of labor and expense. Fortunately for our present purpose, in the spring of 1882, we set out a bed of asparagus plants, in one half of which we trenched the soil to a depth of eighteen inches, putting in a liberal quantity of stable manure. The other half of the bed, also well fertilized, was simply forked to the depth of about six inches.

July 10 we washed out the roots of a plant on the trenched, and also on the untrenched part of the bed. The variety was Moore's Cross-Bred. We find that in the asparagus and onion, two plants that belong to the same natural order, the root system is not unlike in kind, and in these two plants, it is decidedly different from that of any other garden plant that we have examined. This difference is to be expected when we remember that these plants belong to the botanical division *Endogens* or inside growers, while almost all our other garden plants belong to the division *Exogens*, or outside growers.

The asparagus has no tap root, but instead, many long, rather thick, cylindrical roots that unite in a crown at the base of the stem, forming a densely matted root-stock. The longest of these cylindrical roots penetrated the soil to a depth of more than two feet, and others extended horizontally an equal distance. The roots seemed never to branch after leaving the crown, though they put out some short fibers. The latter were very few however, in proportion to the main roots. These were about one-fourth inch in diameter, and scarcely tapered except at the extremities, where they were bluntly pointed. The points reminded us somewhat of the terminus of an underground stem of quack grass, or the shoots of raspberry stems, when about to take root.

The new roots appeared growing out above the old ones, and at the base of the embryo shoots, that are to form the stems for next season. These were shorter and more nearly white than the older ones, and like the latter, had fibrous roots. The roots formed the previous year appeared to have made an additional growth from their extremities the past summer. At least a part of them were more nearly white, and more tender towards the extremity, than near the crown, while those toward the base of the crown, which were presumably formed earlier, were of uniform brownish color throughout. The original roots of the plants seemed to be mostly alive though they were very much crowded by those later formed. The greater part of the feeding ground of the roots seemed to be within fifteen inches of the surface, though many roots extended below this.

Strange to say, no difference appeared either in the amount or distribution of the roots where the soil was trenched, and where not trenched at the time of setting the plants.

The very extensive root system of the asparagus plant clearly shows the folly of crowding the plants in the bed. The plantation from which the plants were examined was not at the time three years old, yet the roots penetrated beneath an area five feet in diameter. It would seem that the plants should not be set less than three feet apart each way, though we have rarely seen plants of asparagus set at such great distances. It is well known that this crop demands manure in immense quantities for its best development as ordinarily grown, a fact which is easily explained when we consider how much the roots must be crowded in the soil.

The new roots, growing out above the old ones, makes it appear that the method commonly practiced in France of setting the plants in trenches may be based upon scientific principles. The asparagus growers about Paris set their young plants in furrows, gradually drawing the soil to them year by year until at length the rows occupy a ridge in place of a furrow.

ONION.

In the onion the root system is by no means extensive, but it is very much concentrated. The roots seem to take complete possession of the soil beneath a circle about eight inches in diameter, for a depth of about ten inches. In a sample of the Blood Red variety examined September 15, very few roots penetrated beyond these limits. An occasional one was traced horizontally a distance of ten inches from the bulb. The roots of the onion, like those of asparagus, do not branch, in the strict sense of the word, though they give rise to many short fibers. In the sample examined, the fibers were invariably simple, that is they never sub-divided.

The concentrated root system of the onion explains the fact that it develops to perfection only in highly fertile soil, and that the bulbs may be grown very close together. In no other vegetable that we have examined, does the root system occupy so little space, and no other vegetables with which we are acquainted endure crowding so well as the onion, and the other plants of the onion tribe.

RADISH.

July 9 we examined the roots of a plant of the Gray Summer Turnip radish, and also one of the London Particular Long Scarlet variety. The roots of both penetrated the soil a distance of two feet, while the branches extended on either side more than twenty-one inches, mingling with those from adjoining rows. The tap root did not begin to branch much until some distance below the edible part. The branches at first were few in number, usually but two or three at the tap root. These extended nearly horizontally, and ramified towards their extremities into many fibrous roots. The greater part of the feeding roots lay in the upper eight inches of the soil.

Though the edible roots of these two varieties are quite different in form, their rooting habits show no difference. We see that the radish is a rather shallow rooting plant, and that its roots extend horizontally for a considerable distance. It is evident, therefore, that unless the soil contains abundant available plant food, the rows should not be planted as closely as the small size of the edible root might suggest; also, that stirring the soil deeply between the rows, as the plants advance toward maturity, must lacerate the fibrous roots.

BEET.

On September 16 we examined the roots of a plant of the Extra Long Dark Blood beet. The main root was smooth and symmetrical to the depth of eight inches, below which it divided into several branches, which were quite thick at first, but rapidly tapered to the size of a stalk of timothy grass, tapering gradually thereafter until they become fibrous roots. One of the longer ones extended two feet downward, while horizontal branches, which were mostly shallow in the soil, extended a distance of two and a half feet. The small fibrous roots seen on the surface of beet roots after they are pulled seem to have very little office, as they penetrate the soil scarcely half an inch. The feeding roots chiefly proceed from the tap root, below the thickened portion. Fibrous roots from the branches often extend upward apparently to the surface of the ground.

The root system of the Eclipse beet, which is a turnip-rooted variety, growing largely above ground, is precisely similar in kind but slightly less extensive. We traced the roots downward about twenty-two inches, and horizontally a distance of two feet.

We thus see that the beet plant draws its nourishment from an area of twelve to twenty square feet, and hence it is evident that where size of root is desired, the plants must be given plenty of room.

SWISS CHARD.

The root system of the Swiss Chard is decidedly more extensive than that of the garden beet. On September 16 we traced a branch from a plant of Beck's Sea Kail Chard, horizontally, a distance of three and a half feet, and the tap root, at the depth of two feet, was of the thickness of a wheat straw. The tap root and larger branches were thick and fleshy near the surface, the former regularly tapering as it extended downward, giving rise to branches on all sides. Some of the latter were three-fourths of an inch in diameter, the larger ones starting about four inches below the surface. Fibrous roots were numerous in the upper layers of the soil.

The chard is a plant of the beet family in which the foliage instead of the root has been developed through selection. It is interesting to observe that with a decided increase of foliage over the common garden beet, we have a corresponding extension of roots.

PARSNIP.

In the parsnip the tap root is very long, and tapers very slowly after the first few inches in depth. In a plant of the Long Hollow Crown variety, examined September 17, we traced the tap root downward a distance of thirty inches, beyond which it was too delicate to follow. Branches leave the tap root throughout its length, many starting out below the clay line. One of these, at a depth of two feet, we followed a distance of seven inches through very stiff

clay. The fibrous roots in the upper layers of the soil are numerous but short, the longest ones appearing to extend but about fourteen inches from the main root. Considering the proportion of the roots that lie deep in the soil, the parsnip is a deep-rooting plant.

CARROT.

The root system of the carrot, as compared with that of the beet, is very small. September 16 we examined the roots of a plant each of the French Forcing and Long Red Altringham varieties. Of both the tap root was small and soon tapered into a filament. We traced it downward sixteen inches, at which depth it was too delicate to follow further. The horizontal roots apparently extended little more than a foot. The fibrous roots chiefly proceeded from the tap root, though a few started from near the base of the thickened part. These extended both deep and shallow, some rising nearly or quite to the surface, while others apparently penetrated as deeply as did the tap root.

It would appear from the slight extent of the horizontal roots in the parsnip and carrot, that these would prosper under closer planting than the beet can endure, though we believe it is usually recommended to plant the three at about the same distances.

The beet and carrot are biennials, forming their thickened roots the first season, and flowering and producing seed the second. In order to compare the roots of these plants in the first and second season of their growth, we examined, on September 17, the roots of a plant of each, that was set out in the spring to produce seed. The beet in this case was of the Early Bassano variety, and the carrot of the Long Orange. As the varieties were not identical with those examined of the first year's growth, the two may not be strictly comparable. We note, however, that the leading roots in the plants of the second year's growth extended quite as far as those in the first. The fibrous roots, however, appeared less numerous. They were certainly so in the beet. In the plants grown directly from seed, numerous fibres left the horizontal leaders and extended upward to the surface of the ground. Nothing of this kind appeared in the plants of the second year's growth.

The lower roots of the carrot were developed to a greater extent in plants of the second year's growth than from those grown directly from seed.

How much of the stored material in thickened roots, like the beet and carrot, is used in the production of seed is an interesting question. We observed that the roots that had supported the flower stem until the seed had formed and ripened, were not materially different in appearance from others at the end of the first season's growth. A cross section of the root was entirely sound, and exhibited the concentric rings, as in the first season's growth. To give an indication of the amount of nourishment that had been consumed in forming the crop of seed, we tested the amount of sugar in a root

of Bassano beet that had produced a crop of seed, and one of the same variety at the end of the first year's growth. The former contained five and three-tenths per cent of sugar; the latter very nearly seven per cent, showing a difference in sugar content of about one and seven-tenths per cent.

MUSKMELON.

September 17 we examined the roots of a plant of the Oblong Netted Muskmelon. The plant had not made a very vigorous growth. The roots were for the most part very shallow in the soil, though we traced a single one to the depth of sixteen inches. The main roots extended horizontally, and at a depth of three to five inches below the surface. We traced one of these a distance of three feet, which was as far as the longest stem reached. Short fibrous roots are, however, quite numerous at a depth of eight or ten inches.

It thus appears that the muskmelon is a shallow rooting plant, but that its roots draw nourishment from a large area. This would seem to show that the method, so often practiced, of applying all the manure intended for this crop immediately beneath the hill, is not founded upon good judgment. Active manure in the hill may be very valuable as a stimulant to the young plants, but as the chief feeding ground of the roots is not beneath the hill, it would seem that a portion at least of the fertilizer should be applied for the benefit of those far reaching roots that develop at the time the fruit is forming and maturing.

CABBAGE.

The root system of the cabbage is of the same kind as that of the cauliflower which we described in our last report, except that in the sample examined it was less extensive. On September 15 we washed out the roots of a finely headed plant of Very Early Etampes cabbage. The tap root extended to the depth of twenty inches, and the horizontal roots a distance on either side of about eighteen inches. The fibrous roots lie chiefly in the upper layers of the soil, although they occasionally appeared at a considerable depth. Some of these rose upward apparently to the surface of the soil. It is entirely possible that had we chosen a plant of one of the larger growing late varieties, we should have found the root system more extensive.

KOHL RABI.

The root system of the Kohl Rabi as indicated by a plant of the Early Purple Vienna variety, examined September 15, is very similar in kind, and in extent to that of the cauliflower. We traced the tap root to a depth of more than two feet, following it through fourteen inches of a very compact clay. Owing to the delicacy of the root we were unable to reach the end. The horizontal roots ex-

tended two feet on either side. As in the cauliflower and cabbage, the fibrous roots were most numerous in the upper eight inches of the soil.

From our observations made thus far, it appears that in the cabbage family, the extent of the roots bears a relation to the amount of the foliage. Thus in a plant of Cauliflower, of which the foliage was more abundant than that of the sample of cabbage examined, the root system was decidedly more extensive. In a plant of Kale, having a still larger development of foliage, we found a correspondingly more extensive development of roots.

Although the members of the cabbage family, that we have examined, may in one sense be considered as deep rooting plants, from the number of their fibrous roots that lie near the surface, it seems probable that so far as methods of culture are concerned, they should be regarded as shallow rooters.

CELERY.

October 9, we examined the roots of a plant of Boston Market celery. We found the root system rather concentrated. The deeper roots extended scarcely more than fifteen inches, while the horizontal ones reached no further. The fibrous roots were numerous. Many of these proceeded from the tap-root just below the base of the leaf stalks. Others grew out from the main roots, of which there were four in the plants examined. These were of about the thickness of a wheat straw and tapered rapidly until they became fibrous. The fibrous roots did not rise into the soil placed about the leaf stems for blanching.

GENERAL OBSERVATIONS.

It is entirely possible that the average farmer and gardener do not realize the extent of the area traversed by the roots of their crops. We are accustomed to think of a plant as obtaining its nourishment from a small area directly beneath the foliage, whereas, as appears from our observation, many plants seem to secure a large part of their food beyond the extent of their leaves. If this be true, it is obvious that the effects of hill manuring must be chiefly upon the young plant, and that where no fertilizer is applied beyond the limits of the hill, it seems probable that the plant receives little benefit from the manure at the time when it is completing its growth, and maturing its seed.

What object is attained by the deeply penetrating roots of vegetables, as noted in the case of the pea, parsnip, etc., is an interesting question. Certainly they are not required for the purpose of sustaining the plant against wind. If they were in search of food they would hardly penetrate in this direction, for we have many examples in which the roots of plants have extended towards their food with a directness that seems almost like instinct. If they were seeking moisture, it would seem that they might secure it at a lesser

depth. The fact that the fibrous roots are almost always most numerous in the upper layers of the soil would seem to indicate that a dearth of moisture had not existed here.

Insecticides.

We made many experiments upon the injurious insects that attacked our garden crops the past season, but the results of our work may be briefly told. We regard it as unnecessary to detail experiments that yielded negative results, however much care was used in carrying them out. Our experience leads us to the opinion that a special mode of treatment must be adopted for almost every destructive insect.

The Turnip Flea Beetle.

We made many applications with the view of discovering the most efficient preventive for the injury wrought by the turnip flea beetle, **Haltica striolata* (Ill.). Among those we mention tobacco water, cut tobacco leaves, kerosene emulsion, and air-slacked lime. The date of each application and the proportions used were noted, and the plants upon which the applications were made, examined daily and the number of insects found counted and compared with the number found upon other plants that had received no applications. We summarize our results as follows:

A strong decoction of tobacco proved very efficient when frequently applied; but its strength seemed to volatilize quickly in the sun. At least our figures indicated that little, if any, benefit came from the application after two days. Our decoction was made by soaking tobacco leaves in cold water for twenty-four hours, when the water was poured off and applied to the plants by means of the garden sprinkler.

We found the kerosene emulsion diluted with eight parts of soft water to be very efficient, but its effects were little, if any, more lasting than those of the tobacco water, and when frequently applied it evidently retarded the growth of the plants.

We will here describe our method of making the kerosene emulsion. We used the same formula in all our experiments, so that whenever we have occasion to refer to it hereafter it may be understood to be precisely of the proportions noted here. We combined one gallon of kerosene oil, one gallon of water, and four pounds of common yellow bar soap, heating the mixture and stirring it occasionally until the mass became homogeneous, then stirring it constantly until it became thick by cooling. We found this preparation to be entirely permanent, and we were able to dilute it to any desired extent by the addition of rain water without the oil separating from the mixture before it could be readily applied to plants.

Tobacco leaves cut fine, by passing them through a fodder cutter when placed about the plants of radish, had a marked effect in keeping off the flea beetle, the appearance of the leaves showing the

* *Phyllotreta striolata* (Fabr.).

beneficial result. We noted also that the application of tobacco, whether in the form of a decoction or the cut leaves, seemed to stimulate the growth of the plants.

Air-slacked lime dusted over the plants while wet proved unquestionably beneficial, and in dry weather its effects are quite lasting.

Among the applications that proved valueless, we mention kerosene mixed with sand at the rate of an ounce of the former to a pound of the latter; Buhach powder mixed with alcohol, diluted with different proportions of water and soluble phenyle, dissolved in various proportions of water.

We have frequently noted that plants of cabbage, radish, etc., grown in the cold frame are scarcely injured by the flea beetle. As an experiment we planted a small plat of radishes in a frame made of boards a foot wide. The plants were very little injured by the beetle. We noted that in one case, where the leaves of a plant reached over the edge of the frame, this plant had many beetles upon it, while the others were almost entirely free from them. This leads us to recommend, growing so far as practicable, all plants injured by this pest in a frame made of wide boards. It appears that this insect, though very agile, does not jump very high, and hence may be kept away from plants in this manner.

The Radish Fly.

The larva of the radish fly, *Anthomyia radicum*, proves very injurious to the roots of radishes when grown on the heavy soil of our garden. None of the applications used for the flea beetle had any perceptible effect in preventing its injuries. We found that bisulphide of carbon applied to the soil about the roots of the plants destroyed the maggots that had not yet entered the roots, but it had no perceptible effect upon those within. The use of this liquid as an insecticide is accompanied by so many disadvantages that we must at present consider it of little value.

We obtained very satisfactory results with the use of coal ashes as a preventive of injury from the radish fly, which are noted in detail in treating of the radish.

THE STRIPED CUCUMBER BEETLE.

But one application seemed beneficial in preventing the injuries of the striped cucumber beetle, *Diabrotica vittata*. This was Paris green mixed with water at the rate of half a tea-spoonful to two gallons, and the mixture applied with care to both sides of the leaves. When applied only to the upper sides of the leaves it proved less efficacious, as the beetles remain much of the time during sunny weather upon the lower sides of the leaves and upon the stems.

Our efforts to repel this insect by powerful odors proved useless. We dipped corn cobs in coal tar, and placed them among the plants of a hill of squashes. We then covered the hill with a plant protector, formed of mosquito netting tacked upon a frame, beneath which we

introduced several of the beetles. The insects attacked the leaves with their usual vigor, and the following day, we found that instead of the enclosed beetles attempting to make their escape through the netting, numerous visitors were on the outside trying to make their way in. Cobs dipped in soluble phenyle, a liquid having a powerful odor resembling that of coal tar, gave the same result.

We tried also the kerosene emulsion, and soluble phenyle, diluted with various proportions of water, but they seemed harmless to the beetles in the degree of strength that could be used without injury to the plants.

After making experiments upon the Striped Cucumber beetle during three successive seasons, we have come to the conclusion that it is far more satisfactory to protect the plants from the ravages of this insect than to attempt to destroy or repel it by any other means. By protecting the plants, we escape not only the injury from the beetles upon the leaves, but also that of their larvæ upon the roots. The latter very often destroy the plants that escape the ravages of the beetles. Further, by protecting the plants, we enhance their growth, as we were able to show the past season by many instances.

There are two ways of protecting the young plants. One is to cover the hill before the seed leaves appear above ground, with a plant protector made by a frame of light boards covered on the top with mosquito netting. The other way is to start the plants upon inverted sods in the cold frame; transplanting to the garden or field after they have attained two or three rough leaves. In the latter case the beetles will harass the plant to some extent, but they will rarely destroy them, unless the weather should be very warm and dry after the transplanting.

The method sometimes recommended of outnumbering the beetles by planting a score of seeds where we desire one plant, though it may sometimes work well, is wrong in theory. By multiplying the plants we doubtless multiply the beetles, and in time the latter may so increase as to destroy any number of plants.

THE CABBAGE CATERPILLAR.

After very many experiments upon the larva of the cabbage butterfly, *Pieris rapæ* (L.), we have found but one that is satisfactory, viz.: Pyrethrum or Buhach powder, applied with a bellows. This substance, while almost instant death to the caterpillars, is not injurious to the human family or to plants, and hence may be used with entire impunity. We found that the samples of the powder used were efficacious when diluted with equal bulk of air slacked lime, but when the proportion of the lime was doubled the mixture was not fatal to the insects. Flour is sometimes used as a diluant instead of lime. So much depends upon the freshness and purity of the powder used, that it is impossible to give a formula that will be satisfactory in all cases. It is said that a perfectly fresh, pure powder will bear to be diluted much more than half, and still be fatal to the

worms. We state on the authority of Prof. C. V. Riley that if the powder is mixed with the flour or lime a few hours before it is applied to the plants, it proves more effective than if the mixture is put on immediately after combination. The best time to apply the mixture is on a still day, and if put on in the evening, when the plants are slightly moistened by the dew, the effect is still better. By inserting the nozzle of the bellows among the leaves, and giving a puff with the handle, the powder rises in a slight cloud, and then settles among the leaves, penetrating the interstices more thoroughly than a liquid can do. Owing to the glaucous nature of the leaves, liquids do not spread evenly over them, but the greater part immediately runs off, thus wasting a large part of the poison used. We would not be understood that a single application of the powder will prove entirely effective. The caterpillars have so many opportunities to conceal themselves among the leaves that we cannot hope to reach all at once. New ones are also constantly hatching. The application should be made as often as once a week, and if the plants become badly infested with the caterpillars, it should be used almost daily until the greater part of them is destroyed.

The "Buhach," to which we have alluded, is the product of *Pyrethrum cinerariaefolium*, and is prepared near Stockton, Cal. It is claimed to be superior in strength and purity to the imported Pyrethrum powder, which is the product of *P. roseum*. We made no comparative tests of the two preparations.

THE SQUASH VINE BORER.

This insect was less destructive than usual the past season. We planned a series of experiments in anticipation of its attack, and at the time it was due, applications were already upon the plants. Had the insect appeared in greater numbers, we should have had a better opportunity to judge of our success, but on the whole our results were quite satisfactory.

We chose for our experiments a plat of squashes one-tenth of an acre in extent, of the Hubbard and Perfect Gem varieties. There were four rows of each variety in each of which were planted eight hills. Commencing July 12 we applied to one row of the Hubbard variety one-fourth of a pound of sulphate of iron, in solution, upon the soil immediately about the plants. (A similar experiment in 1883 seemed to promise favorable results.)

To a second row we applied Paris green, mixed with water at the rate of half a tea-spoonful to two gallons, carefully pouring the mixture over all of the stems for a distance of two feet from the base of the plants.

In a third row we placed corn cobs dipped in coal tar, putting five in each hill.

The fourth row of the Hubbard we left without an application for comparison with the others.

To one row of the Perfect Gem we applied the kerosene emul-

sion, dissolving one-half gill of the emulsion in two gallons of water, using the solution in the manner just described for the Paris green.

The application of the kerosene emulsion and the Paris green and water was repeated after every hard rain until September 1st. The corn cobs were dipped in coal tar, at intervals of about three weeks until the same date. The application of the copperas solution was not repeated.

We made no attempt to remove any borers from the stems until after the fruit had been gathered. On September 29 we carefully examined every stem on seven rows, splitting the stems lengthwise, and counted the borers, or cavities whence they had escaped, with the following results; (we use the word cavity instead of borer, as in the majority of cases the maggot had left the stem at the time of our examination):

Hubbard Squash:

On the row not treated we found	23 borer cavities.
On the row treated with copperas solution we found	21 borer cavities.
On the row treated with Paris green and water we found.....	8 borer cavities.
On the row treated with corn cobs dipped in coal tar we found .	3 borer cavities.

Perfect Gem:

On the row treated with kerosene emulsion we found.....	2 borer cavities.
On the row not treated we found	8 borer cavities.
On a second row not treated we found.....	7 borer cavities.

The Perfect Gem squash is decidedly less liable to the attacks of the borer than the Hubbard, a fact that we have noted in previous years. The effects of the emulsion, therefore, are comparable only with the rows below which received no applications. It is to be remarked in the case of the Paris green and water, that every borer cavity was found at a greater distance from the base of the plant than where the mixture was applied. As the result of our previous observations, we had formed the conclusion that the borer is very rarely found at a greater distance than two feet from the base of the stem. We find, however, that this conclusion is fallacious, at least in the Hubbard squash.

It appears that the Paris green and water, the cobs dipped in coal tar and the kerosene emulsion were all beneficial in hindering the work of the borer. The row treated with the Paris green and water, however, lay next to the one in which the cobs were placed, and the moth may, therefore, have been repelled somewhat by the odor of the coal tar.

The coal tar application is probably more permanent in its action than either the Paris green or the kerosene emulsion. We may assume, however, that it does not destroy the insects, but only repels them, while the other two probable act by poisoning the young maggot, as it eats its way into the stem. The use of coal tar is more convenient than that of the other applications, and if further experiments should prove it to be effectual, we shall have mastered one of the chief insect enemies with which the squash grower has to contend.

THE ASPARAGUS BEETLE.

On June 10 we noticed an unfamiliar insect feeding upon the foliage of asparagus. We submitted samples of it to Prof. J. A. Lintner, State Entomologist, who pronounced it the asparagus beetle, *Crioceris asparagi* L., and stated that, so far as he knew, this was the first appearance of the insect in Western New York. As this pest is little known to the farmers of New York, we submit a brief account of its appearance and habits condensed from Prof. Lintner's first annual report.

The asparagus beetle first appeared in this country in the year 1859, at Astoria, near the western end of Long Island. It was introduced from Europe, where, strange to say, it is not injurious. Its spread since its introduction has been very slow, and up to the past season very little seems to have been heard of it except in Long Island and New Jersey. The injuries wrought by it are very serious when the attack is severe, often necessitating plowing up whole fields of asparagus.

The small blackish brown eggs of the beetle are deposited on end, on the young plant, usually in rows of two to seven. When the plants are grown the eggs are deposited on the leaves near the ends of the delicate branches.

The greatest length of the young larva is about one-fourth of an inch. "It is of an obscure olive, or dull ash gray color, often with a blackish stripe along the middle of the back. It is soft and of a flesh-like consistency, about three times as long as thick, thickest back of the middle with the body much wrinkled transversely. The head is black and shining, and the neck, which is thicker than the head, has two shining black spots above. Three pairs of legs are placed anteriorly upon the breast, and are of the same shining black color with the head. As will be seen when it is crawling, the larva clings also with the tip end of the body, and all along its under side may then be seen two rows of small tubercles slightly projecting from the surface which serve as prolegs in addition to the tip of its body. Above these tubercles on each side is a row of elevated shining dots like warts, above which the breathing pores appear like a row of minute dots." (Fitch.) The average length of the beetle is a little less than one-fourth of an inch. "The head is black with the first three joints of the short antennae smaller and differently colored than the remainder. The finely punctured thorax is tawny red marked more or less distinctly on its crown with two black spots. The wing covers are punctured in rows, and usually appear of a lemon color, broken into three spots on each, by a black stripe along their junction, a black transverse band a little behind their middle, and an interrupted one near their tips. Outwardly the wing covers are bordered with orange. The body beneath, and the legs are shining black, the latter sometimes showing a yellowish band upon them. The wing covers marked as above suggest a representation of a black cross upon the back, for which reason it is sometimes known in England as the 'cross bearer.'" Another variety of the beetle differs considerably in its markings from the above description.

The history of the asparagus beetle is in brief as follows: The beetles destined to continue the species survive the winter in dry sheltered places. On the appearance of the asparagus shoots in the spring, they emerge from their winter quarters and commence to feed upon the tips of the plants. The sexes pair, and the female deposits her eggs upon any portion of the exposed shoots. The eggs hatch in about eight days, and the larvae complete their growth in about twelve days. They then enter the earth a short distance, or conceal themselves between dead leaves or other material on the surface. Constructing a cocoon, they undergo their transformation and remain in their pupal state about ten days. Thirty days complete the cycle from the egg to the perfect insect. As soon as the beetles emerge they pair, and deposit their eggs, from which a second brood appears about the first of July, followed by a third probably in August. Hence we have the larvae and the beetles with us in their successive broods from early spring until September.

The preventives and remedies that have been used for this insect in this country are dusting slacked lime over the plants, while the dew is on, which destroys the larvae. It is also recommended to remove all the young seedlings from the bed as fast as they appear, thus compelling the beetles to deposit their eggs upon the young shoots. As the latter are cut for market daily, the hatching of the eggs is in a great degree prevented.

THE CABBAGE APHIS.

On August 20, we noticed that three plants of cabbage set out in the spring for seed were badly infested with aphides. To one plant we applied pure pyrethrum powder, by means of the bellows; to the second we applied soluble phenyle diluted with water, using a teaspoonful to a gallon; to the third we applied the kerosene emulsion diluted with sixty-four parts of water.

From the plant dusted with pyrethrum powder, the aphides commenced to fall to the ground at once, and continued to drop for three hours. Many of those that dropped, however, were not immediately killed.

The soluble phenyle solution mostly run off from the foliage at once, and the aphides wet with it were not killed.

The kerosene emulsion adhered to the foliage much better than the phenyle solution, while every aphis wet with it seemed to be instantly killed. Of the three insecticides, the kerosene emulsion was evidently most efficient.

The following day many aphides on the plant treated with pyrethrum powder seemed to have entirely recovered from its effects. The insects on the one treated with phenyle solution seemed as numerous as ever. But on the plant treated with the kerosene emulsion, live aphides could only be found in places not touched by the emulsion.

Little's Soluble Phenyle.

The soluble phenyle alluded to is a liquid possessing a very powerful odor closely resembling that of coal tar, and is instantly soluble in water to which it gives a milk-white color.

We tested it in many ways upon the various insects that trouble garden plants, but failed to find an instance where we can recommend its use. Unless very largely diluted, it is fatal to foliage, and in our trials it seemed more injurious to vegetable than to insect life. It is possible, however, that we have not yet discovered the best way of using it.

Hammond's Slug Shot.

A package of this insecticide was sent us for trial. We found its claims fairly well substantiated as a destroyer of insects. The indications are, however, that it is no more nor less than London Purple mixed with a very large proportion of gas or slacked lime. If this is so, the claims that it is not injurious to the human family nor to stock are entirely unwarrantable, and the price at which it is sold, though apparently very low, is many times the value of the ingredients.

Buhach as an insecticide for the Potato Beetle.

It has been claimed that Buhach powder will kill the potato beetle when applied to it in the open air. With the view of verifying this statement, we thoroughly dusted several beetles while on the plants with the pure powder on July 25, and after they had fallen to the ground, placed them into a bottle, over the top of which we tied a bit of mosquito netting. The beetles soon recovered their activity and exhibited no inconvenience as the result of the application. A bit of potato foliage was placed in the bottle, in order that the starvation of the beetles might not convey a wrong impression as to the effects of the poison. Later observation however showed that this precaution was entirely unnecessary, for on August 29, thirty-five days afterward, some of the beetles were still alive. These applied themselves with their accustomed vigor to potato leaves inserted into the bottle, though they had fasted during a full month.

RASPBERRY.

Test of Varieties.

In the year 1882, two plants each, of thirty-two varieties of raspberry were planted out in the Station garden. The plants were set out in rows, six feet apart, and three feet apart in the row. No winter protection has been given. The soil has been cultivated sufficiently to keep down weeds, and the canes were tied to stakes as they became sufficiently tall to require support.

All of these plants have survived thus far, except five, viz., two Brinkles Orange, which were winter-killed the first winter after set-

ting, two American Blackcap and one Prosser. The remainder of the plants bore their first full crop the past season. We have kept a careful record of the date at which each variety commenced to ripen its fruit, the number of days that each continued in bearing, and the total yield of each; taking notes also as to the comparative size and quality of the fruit in the different varieties. We present an abstract of our results in tabular form, as follows:

(The total yield is given in ounces and decimals of an ounce; and the comparative size of the berries of the different varieties is shown by the weight of twenty-five samples, given in grains:)

	First ripe fruits.		Total yield in ounces.	Number of days in bearing.	Weight of 25 berries in grains.
1. Brandywine.....	July	5	7.295	33	478
2. Caroline.....	"	8	44.374	30	524
3. Clarke.....	"	5	65.386	30	650
4. Cuthbert.....	"	8	22.868	30	601
5. Davison's Thornless.....	"	1	14.233	22	300
6. Delaware.....	"	5	44.529	33	447
7. Early Prolific.....	"	3	80.326	35	655
8. Fastolff.....	"	5	19.845	26	540
9. Fontenay.....	"	5	31.527	33	833
10. Franconia.....	"	12	15.185	26	640
11. Gregg.....	"	14	17.009	21	439
12. Herstein.....	"	5	17.239	26	620
13. Henrietta.....	"	5	19.654	26	617
14. Highland Hardy.....	"	2	12.427	28	408
15. Knevett.....	"	5	19.820	33	798
16. Mammoth Cluster.....	"	10	26.392	25	331
17. Mrs. Wood.....	"	3	36.035	35	733
18. Naomi.....	"	3	1.323	28	234
19. Parnell.....	"	5	26.607	30	540
20. Philadelphia.....	"	8	6.420	28	227
21. *Prosser.....	"	5	15.083	26	308
22. Palluau.....	"	5	6.952	26	308
23. Red Antwerp.....	"	3	18.556	35	555
24. Reliance.....	"	5	17.242	26	432
25. Seneca.....	"	10	29.030	25	347
26. Thwack.....	"	3	29.085	36	710
27. Turner.....	"	3	19.171	28	432
28. Vice-Pres. French.....	"	5	35.865	30	586
29. Victoria.....	"	5	37.090	33	463
30. Yellow Antwerp.....	"	10	20.529	28	470

* The yield of this variety is calculated from one plant.

We made the following notes in relation to quality, etc. :

2. Delicate and pleasant, but not rich, moderately firm.
3. Rather sweet and delicate, but not rich, moderately firm.
4. Very sweet and rich, firm.
5. Sweet and rich, rather firm.
6. Rather soft; very sweet and delicate, resembling that of the wild red raspbeary.
7. Flavor a well marked, rather harsh acid; moderately firm.
8. Moderately rich, sweet, not very firm.
9. Extremely rich and sweet; moderately firm.
10. Rich and sprightly; moderately firm.
11. Flavor rather inferior, firm.
12. Sweet and delicate; moderately firm.
13. Insipid, with little raspberry flavor; moderately firm.
14. Very sweet and delicate; rather soft.
15. Moderately rich and sweet; moderately firm.
16. Insipid; firm.
17. Very rich, sweet and delicate; rather soft.
18. Very sweet, but lacking raspberry flavor; rather soft.
19. Lacks sweetness, richness and raspberry flavor; moderately firm.
20. Rather insipid; moderately firm.
21. Very sweet and delicate; moderately firm.
22. Sweet, but leaves an acid taste in the mouth; moderately firm.
23. Moderately rich and sweet; rather soft.
24. Flavor insipid; moderately firm.
25. Rather insipid; firm.
26. Sweet and rich; quite firm.
27. Very sweet and delicate; moderately firm.
28. Extremely rich and sweet; moderately firm.
29. Extremely rich and sweet; moderately firm.
30. Delicate, but not high-flavored; very soft.

It will be observed that our list is not confined to the newer varieties, but includes many of the older sorts as well.

The old Early Prolific proved by far the most productive. This variety, now little grown, possesses the valuable qualities of great prolificacy and hardiness, with entire freedom from thorns; and though the harsh acid flavor of its fruit makes the latter undesirable, it would seem that its good qualities might render it valuable as a parent for new varieties.

The Clarke proved second in productiveness, the Delaware third and the Caroline fourth; the Philadelphia, Brandywine and Naomi, were least productive. Davison's Thornless was earliest to ripen, while Gregg was latest. Early Prolific, Mrs. Wood and Red Antwerp continued the longest in bearing, while Gregg yielded its crop in the shortest time.

It appears that the berries of Knevett (Knevett's Giant) were largest, those of Mrs. Wood were second in size, while those of Naomi and Davison's Thornless were smallest. In flavor, the Delaware seemed to surpass all others in the characteristic aroma of the wild red raspberry, and Fontenay, Vice-President French and Victoria were superior in richness and sweetness.

STRAWBERRIES.

An Experiment in Irrigation.

We made an experiment in irrigating the strawberry, using for the purpose a small plat set out in the spring of 1882. The varieties were Wilson, Triomphe de Gand, and Harvey Davis, of which the plat contained three rows, thirty six feet long, of each. A stream of water was conducted from a hydrant through a five-eighths inch gas-pipe, and so applied that it flowed along one row of each of the three varieties. It is evident that the row to which the stream was applied received the greater part of the water, the second row received less, and the third row received less than the second.

The water was turned on May 20, and was permitted to flow, with a few interruptions, night and day until the berries had all ripened. The weather was very dry during June, hence the influence of the irrigation was doubtless greater than it would have been had there been abundance of rain during this month.

The lay of the plat was such that the plants of Triomphe de Gand received the largest share of the water, and those of Hervey Davis the smallest; the Wilson receiving a portion intermediate between the other two. The Hervey Davis received only the water that had first passed over the other two.

The yield of berries on the different rows was carefully noted at each picking. We will speak of the rows of each variety as Nos. 1, 2, and 3, No. 1 being the irrigated one. In the Hervey Davis variety, the plants had been permitted to form matted rows, hence we are compelled to give the yield of the entire row. In the other varieties in which the plants were in hills, we give the yield per plant. The weights in the Harvey Davis are given in pounds and ounces, and in the other varieties in grains.

	First row.		Second row.		Third row.	
	No. of berries.	Wt. of same. grains.	No. of berries.	Wt. of same. grains.	No. of berries.	Wt. of same. grains.
Triomphe de Gand (per plant)....	20	1027	18	930	26	1099
Wilson (per plant)....	49	1733	30	945	42	1344
		lbs. oz.		lbs. oz.		lbs. oz.
Hervey Davis (entire row)...	917	7 8.9	616	4 8	408	2 8.5

We thus see that in the Triomphe de Gand, which received the most water, the yield of the third row exceeded that of the first; in the Wilson, the first row yielded slightly more than the third; and in the Hervey Davis the first row yielded more than double that of the third.

The result of our experiment indicates just what we should expect; that an excess of water is not beneficial, but rather injurious, but that a moderate amount of water constantly maintained, greatly increases the yield.

In order to note the effects of irrigation upon the quality of the fruit, we determined the moisture in one sample taken from plants that were constantly surrounded by water, and in a second taken from the row that received the least water. The result was as fol-

lows: The average of two samples from the irrigated row showed 10.9 per cent, of solid matter; while the same from the row not irrigated showed 12.798 per cent of solid matter. The difference shows therefore very nearly two per cent of solid matter in favor of the rows not irrigated.

TOBACCO.

An Experiment with Fertilizers.

We desired to test the influence of certain fertilizers upon the growth of the tobacco plant, and upon the burning quality of the leaf. For this purpose we selected a piece of ground that had been in sod, and had received no fertilizer of any kind since the establishment of the Station.

We desired to compare especially the influence of chloride, (muriate) and the sulphate of potash upon the burning quality of the leaf; the effects of stable manure and superphosphate upon the growth of the plant; the effects of stable manure applied upon the surface, and plowed under, upon the growth of the plant, and to compare the effects of all these, with plants grown on unfertilized soil.

The tests were made on six plats, each one-twentieth of an acre in extent, designated as F. 10, to F. 15, inclusive. The soil of all was plowed before any fertilizers were applied.

Plat F. 10 was divided into two equal parts. On one, the south half, thirty five cubic feet of well rotted stable manure was applied evenly on the surface. On the north half of the same plat, the same amount of stable manure was applied, but buried to the depth of eight inches beneath the surface, which placed it below the sod. This application is at the rate of eleven cords per acre.

Plat F. 11 received no fertilizer.

Plat F. 12 received seventy cubic feet (at the rate of eleven cords per acre) of well rotted stable manure spread evenly upon the surface.

Plat F. 13 received fifty pounds superphosphate, or at the rate of 1,000 pounds an acre.

Plat F. 14 received forty eight pounds chloride (muriate) of potash, or at the rate of 960 pounds per acre.

Plat F. 15 received fifty six pounds sulphate of potash, or at the rate of 1120 pounds per acre.

The stable manure was applied before the plants were set. The other fertilizers were applied June 13 and July 10, one-half of the amount on each day.

The plants which were of the Belknap variety, were set out on June 7, and those that failed to survive were reset later. They were topped as soon as the flow buds appeared, and were cut Sept. 12.

The two halves of F. 10 are comparable with each other, F. 12 and F. 13 are comparable, also F. 14 and 15; and all are comparable with F. 11 which received no fertilizer.

We give the weights of green tobacco, and of cured leaf per hundred plants, also the percentage of cured leaf, as follows. As the

number of plants in every case exceeded one hundred, the differences are diminished rather than increased by presenting the figures in this way.

PLAT	Wt. of green plants.	Wt. of cured leaf.	Per cent of cured leaf
F. 10. North half.....	290.4	33.4	11.5
F. 10. South half.....	249.08	27.19	10.92
F. 11. (No fertilizer).....	217.33	26.096	12.00
F. 12. (Stable manure)	270.41	29.4	10.87
F. 13. (Superphosphate).....	267.09	30.69	11.49
F. 14. (Muriate potash).....	277.05	30.06	10.85
F. 15. (Sulphate potash).....	245.1	28.33	11.56

From F. 10 it appears that where the stable manure was buried eight inches below the surface, the yield was perceptibly larger than where spread upon the surface; the difference being at the rate of about 248 pounds of cured leaf per acre.

The differences between F. 12 and F. 13 and between F. 14 and F. 15 are so slight as to be inconsiderable.

Where no fertilizer was applied the yield was smallest of all, while the per cent of cured leaf was highest.

The conclusions suggested, if any, are that the amounts of superphosphate and chloride of potash used produced an effect upon the yield equal to the given amount of stable manure applied on the surface.

Burning Quality.

We submitted samples of the tobacco grown under the various conditions to Mr. John Brand, of Elmira, N. Y., a tobacco packer of long experience. He pronounced the samples grown upon soil fertilized with stable manure to burn decidedly freer than those from the soils differently treated. All, however, burned with a white ash. Mr. Brand is of the opinion that in a soil containing abundance of lime, tobacco always burns with a white ash; and that in such soils the use of commercial fertilizers will not affect the color of the ash.

Varieties.

We have continued the growing of the different varieties of tobacco grown upon the station in 1882, with the view of noting the effect of continuous growing on our soil, upon the quality of the leaf. With a single exception, we have noticed little change in the character of the leaf. A variety, of which the seed was obtained from Messrs. Thorburn & Co. in 1882, under the name Hungarian, produced that season a remarkably thick leaf, absolutely worthless for cigar purposes. In 1883 the leaf was thinner, and in 1884 it was so fine in texture that it was pronounced equal in quality to that of any variety tested. This change in character is doubtless due to

acclimation, as we were careful to inclose the flower heads intended for seed in mosquito netting to prevent cross-fertilization.

The Influence of Early and Late Settings upon the Number of Leaves formed.

In order to note the influence of early and late setting upon the number of leaves formed, we set out one short row of plants of the Brand variety on June 6, a second June 13, a third June 25, and a fourth July 5. The result shows that the number of leaves was greatest on the later plants. Thus seven plants set June 6 averaged eleven and one-seventh leaves per plant, six plants set June 13 averaged twelve leaves per plant, eight plants set June 25 averaged fourteen and five-eighths leaves per plant, and eight plants set July 5 averaged fifteen and three-eighths per plant. Notwithstanding the larger number of leaves in the later set plants, the growth was decidedly larger in those set early.

THE INFLUENCE OF THE SEED COAT UPON GERMINATION.

We have frequently noted, both in our own experiments and in those of others, that peas injured by the pea-weevil usually germinate, if at all, somewhat sooner than uninjured seeds. This fact suggested the question whether this result may not be due to the mutilation of the seed-coat, which thus permits the more ready access of moisture to the interior of the seed. With the view of answering this question, at least in part, we set to germinate on January 2, 1884, forty Black Wax beans, having the seed-coat slightly mutilated on the side opposite the hilum; forty of the same having the seed-coat mutilated in the same way, but afterward greased with tallow, to retard the absorption of moisture; forty with the seed-coat uncut, and finally, forty with the seed-coat uncut, but greased all over with tallow.

The results were as follows :

Set to germinate January 2.	Had germ- inated January 7.	Had germ- inated January 9.	Had germ- inated January 10.
First row seed-coat mutilated.....	23	30	37
Second row seed-coat mutilated, but greased.....	10	25	35
Third row seed-coat not mutilated ..	18	28	40
Fourth row seed-coat not mutilated, but greased .....	..	4	29

In this experiment it appears that mutilating the seed-coat hastened the germination, and that greasing the seed-coat retarded germination, especially when the seed-coat was left entire. This suggests that in seeds of which the outer coat is of a nature that tends to retard the absorption of water, the time required for germination may be somewhat shortened by removing a portion of the seed-coat before planting.

REPORT OF THE CHEMIST.

The analytical work connected with the feeding experiments in January, February and March, to determine the digestibility of certain fodders, and the experiments with brewers grains in September, October and November have occupied a large portion of the year. The analyses made in connection with this work comprise twenty-two food analyses of the ration fed, thirty-four analyses of the dung, and two hundred and twenty analyses of the milk. Butter tests were also made of the milk during the experiment with brewers grains.

A synopsis of the other work done is given below :

1. Food analyses of forage, fruit, seeds, etc.
2. Water analyses. Mostly examinations of the drainage-water from each of the three lysimeters, and seven analyses of well waters for private parties.
3. Six determinations of sugar in the juice of sorghum.
4. Twelve analyses of superphosphate and other commercial fertilizers.

FOOD ANALYSES.

The food analyses made during the year, together with a few similar analyses from our last annual report, are given below.

HAYS.													
1.	* Meadow hay.....												
2.	" ".....												
3.	Clover rowen.....												
4.	" ".....												
GREEN FODDERS.													
5.	* Alfalfa.....	75.01	2.15	4.09	8.68	9.45	.64	8.61	16.31	34.72	37.77	2.59	2.61
6.	* Orchard grass.....	76.25	2.60	2.97	7.60	9.23	1.35	10.95	12.50	32.02	38.85	5.68	2.00
7.	* Soja hispida.....	69.35	2.36	3.04	8.91	14.39	1.05	7.71	12.75	29.06	47.05	3.43	2.04
8.	" ".....	69.85	2.22	3.88	8.26	14.24	1.55	7.35	12.75	27.41	47.35	5.14	2.04
9.	" ".....	70.41	2.58	2.20	7.93	16.01	.87	8.71	7.44	26.80	54.11	2.94	1.19
10.	Prickly comfrey.....	86.14	2.56	3.25	2.00	5.68	.37	18.45	23.44	14.43	41.02	2.66	3.75
11.	* Amber cane.....	75.04	.69	1.03	5.81	17.03	.40	2.77	4.13	23.26	68.22	1.62	.66
12.	" ".....	85.92	.73	1.06	6.56	5.34	.39	5.18	7.56	46.58	37.89	2.79	1.21
13.	" ".....	86.38	.81	1.42	5.45	5.56	.38	5.94	10.42	40.02	40.84	2.78	1.67

Crop of 1883.
" " rowen.
Sept. 19, 1882, beans soft.
Oct. 7, 1882, beans ripe.
Sept. 26, 1883, beans just forming.
Crop of 1884.
Crop of 1883.
Crop of 1884.
Crop of 1884.

		86.05	.66	1.42	3.82	7.73	.32	4.76	10.30	27.44	55.23	2.27	1.65	Aug. 18, 1882, average of five analyses.
14. *	Waushakum corn.....													
15. *	"	84.38	.69	1.76	4.25	8.61	.31	4.46	11.32	27.27	54.98	1.97	1.81	Aug. 25, " "
16. *	"	81.81	.79	1.92	4.44	10.68	.36	4.37	10.51	24.26	58.56	1.98	1.68	Sept. 1, " "
17. *	"	77.34	.88	2.20	4.49	14.53	.55	3.88	9.71	19.82	64.14	2.45	1.55	" 8, " "
18. *	"	75.01	.89	2.37	4.80	16.27	.65	3.58	9.50	19.25	65.07	2.60	1.52	" 15, " "
19. *	"	69.67	.91	2.72	6.12	19.69	.89	2.98	8.98	20.17	64.96	2.94	1.43	" 23, " "
20. *	Husk corn.....	81.97	.87	1.52	5.34	9.49	.81	4.81	8.44	29.63	52.67	4.45	1.35	Aug. 9, 1883.
21. *	"	82.15	1.09	1.45	5.59	9.20	.52	6.12	8.13	31.32	51.55	2.88	1.30	" 22, " "
22. *	Waushakum corn.....	79.59	.72	1.70	4.77	12.69	.53	3.55	8.35	23.35	62.14	2.61	1.35	" 19, 1884, plat C. iv.
23. *	"	80.62	.68	1.54	5.09	11.46	.61	3.52	7.94	26.28	59.13	3.13	1.27	" 20, " ix.
24. *	Minnesota dent.....	82.21	.84	1.83	6.37	8.32	.43	4.72	10.31	35.78	46.76	2.43	1.65	" 21, " "
25. *	New England pop....	87.43	.66	.94	4.47	6.16	.34	5.19	7.50	35.53	49.05	2.73	1.20	" 20, " "
26. *	Sowell's evergreen....	80.48	1.00	1.72	6.14	10.14	.52	5.11	8.81	31.44	51.97	2.67	1.41	" 20, " "
27. *	Waushakum corn and Early amber corn..	82.41	.83	1.47	4.73	9.96	.60	4.70	8.38	26.91	56.60	3.41	1.34	" 19, " "
28. *	Silo corn, So. white...	81.46	1.16	1.02	5.93	9.73	.70	6.26	5.50	31.99	52.48	3.78	.88	Sept. 5, 1882.
29. *	"	80.00	1.10	1.21	6.49	10.71	.49	5.48	6.06	32.45	53.55	2.66	.97	Sample hung in barn till Nov. 27; water assumed as 80 per cent.
30. *	Ensilage.....	78.61	1.50	1.60	7.10	10.22	.97	6.99	7.50	33.20	47.78	4.53	1.20	Taken from Silo Feb. 15, 1883.
31. *	"	82.35	1.05	.87	5.87	8.72	1.14	5.95	4.94	33.01	49.38	6.46	.79	" " March 29, "
32. *	"	84.58	.91	1.13	5.01	7.22	1.15	5.92	7.31	32.48	46.84	7.45	1.17	" " Jan. 25, 1884.
33. *	Clover ensilage.....	.....	....	....	....	....	....	9.35	10.75	40.80	34.03	5.07	1.72	Sent by F. S. Peer, Dec. 22, '83.
34. *	Dry Fodder.													
34. *	Fodder corn.....	56.49	2.71	3.40	15.46	20.64	1.30	6.23	7.81	35.54	47.44	2.98	1.25	Jan. 21, 1884, from same corn as No. 32.
35. *	Soja Bean fodder.....	21.23	8.37	8.42	22.34	38.29	1.35	10.62	10.69	28.35	48.59	1.75	1.71	Feb. 12, 1884.
36. *	Seeds.													
36. *	Frosted corn.....	16.07	1.73	11.12	2.33	65.17	3.58	2.07	13.25	2.78	77.64	4.26	2.12	Dec. 21, 1883.
37. *	Minnesota dent.....	12.61	1.45	8.62	2.31	70.67	4.34	1.66	9.87	2.65	80.85	4.97	1.58	Station crop, 1883.
38. *	Tuscarora soft.....	7.17	1.41	8.82	1.59	75.50	5.51	1.52	9.50	1.71	81.33	5.94	1.52	" " "
39. *	Pearl pop.....	9.84	1.74	11.72	2.34	68.38	5.98	1.93	13.00	2.59	75.34	6.64	2.08	" " "
40. *	Eight-rowed sweet.....	10.10	1.66	10.10	2.44	67.56	8.14	1.85	11.25	2.72	75.12	9.06	1.80	" " "
41. *	Waushakum flint.....	11.91	1.38	11.12	1.91	68.66	5.02	1.57	12.62	2.17	77.95	5.69	2.02	" " "

Food Analytes — (Continued).

DRY SUBSTANCE.										REMARKS.
Albuminoids	Crude fiber.	Nitrogen-free extract	Ether extract	Total nitrogen						
42. C	6	10.87	2.02	80.31	5.24	1.74	Jan. 21, 1884.			
43.	7	11.37	1.77	82.60	2.79	1.82	Feb. 26, 1884.			
44.	3	11.43	2.20	81.79	2.95	1.83	March 13, 1884.			
WASTE PRODUCTS.										
45.	6.63	17.87	8.78	63.27	3.45	2.86	Jan. 2, 1883.			
46. *	6.12	17.06	9.16	64.34	3.32	2.73	Jan. 11, 1883.			
47. *	5.93	17.37	8.74	64.89	3.07	2.78	Feb. 10, 1883.			
48.	7.09	15.87	12.19	61.53	3.32	2.54	Jan. 14, 1884.			
49.	3.46	20.69	14.11	56.51	5.23	3.31	Sept. 24, 1884.			
50.	3.67	20.75	14.82	56.68	4.68	3.52	" 25, "			
51.	4.17	18.94	17.44	53.69	5.76	3.03	" 29, "			
52.	4.90	23.12	18.05	47.92	6.01	3.70	Oct. 18, 1884.			
53.	4.05	20.31	18.40	51.31	5.93	3.25	" 24, "			
54.	3.89	20.00	15.32	54.88	5.91	3.20	" 31, "			
55.	.80	30.25	.79	58.74	9.42	4.84	Jan. 2, 1883, from Major Alvord.			
56.	.65	20.81	.65	59.34	12.62	3.33	Nov. 1884, from Glen Cove Starch Co.			
57.	8.04	43.21	7.31	26.32	15.12	6.93				
58.	5.79	34.50	13.39	37.40	8.92	5.52	Old Process, Amsterdam.			
59.	5.84	32.69	15.19	41.55	4.73	5.23	New Process, Detroit.			

60.	Linseed meal.....	8 55	5.07	32.35	13.77	38.13	2.13	5.54	35.37	15.06	41.70	2.33	5.66	New Process, St. Paul. Sent by Mr. Batchelor, Jan '84.
61.	"	10.00	5.08	31.38	12.90	31.29	9.35	5.65	34.87	14.33	34.76	10.39	5.58	
VEGETABLES.														
62.	* Onion, Red Weathers- field.....	90.32	.42	1.04	.59	7.39	.24	4.30	10.75	6.10	76.36	2.49	1.72	Crop of 1883.
63.	* " Yellow Danvers.	88.20	48	1.14	.71	9.23	.24	4.03	9.69	6.03	78.18	2.07	1.55	" "
64.	* Top onion... ..	81.53	.69	2.11	.74	14.69	.24	3.73	11.14	3.98	79.54	1.31	1.83	" "
65.	Okra.....	87.41	.74	1.99	3.42	6.04	.40	5.90	15.81	27.15	47.95	3.19	2.53	Crop of 1884.
66.	Potato.....	78.88	.89	2.28	.61	17.27	.07	4.23	10.81	2.87	81.77	.32	1.73	Crop of 1883, small potatoes.
67.	"	76.20	.78	2.50	.59	19.91	.02	3.28	10.49	2.47	83.66	10	1.67	Large size
68.	"	80.39	.85	2.50	.85	15.33	.08	4.34	12.81	4.31	78.14	.40	2.05	Small size.
69.	* Sugar pea.....	81.80	.67	3.37	1.59	12.15	.42	3.69	18.50	8.73	66.77	2.31	2.96	Crop of 1883
70.	* String beans.....	83.46	.83	2.75	2.58	10.04	.34	5.01	16.50	15.60	60.84	2.05	2.64	Early China. Crop of 1882
71.	* Tomato, Acme.....	91.26	.73	1.00	.70	5.84	.47	8.32	11.25	8.03	67.05	5.35	1.80	Crop of 1882.
FRUITS.														
72.	* Apple, Tolman sweet.	77.30	.46	.50	1.37	19.96	.41	2.05	2.19	6.02	87.92	1.82	.35	Crop of 1883.
73.	* Raspberry.....	85.82	.53	.99	2.88	.....	...	3.76	7.00	20.31	...	....	1.12	Highland Hardy, June 17, 1883

* Taken from the last annual report.

BUTTER TESTS.

The feeding experiments with brewers grains, extending over a period of several weeks during which time frequent analyses were made of the milk from each of the two Jersey cows, Jem and Meg, gave opportunity for comparing the churning qualities of milk from different cows, under known conditions of feeding, and also of samples of milk from the same cow which differed widely from each other in their composition.

The trials were made with a "Cherry Test churn," the peculiar advantage of which is that it is capable of churning several small samples of milk or cream at the same time, thus insuring uniformity in the amount of churning, to which duplicate samples are subjected. This churn consists of a strong frame of wood to which the cans for holding the milk are securely clamped; the frame is given an oscillating motion by a crank and pitman, the movement being kept steady by a heavy balance wheel attached to the crank shaft. The milk is thrown from end to end of the can, the motion being very similar to that in an ordinary swing churn. The tin cans which came with the churn were found unsuitable for this work, as they were difficultly kept clean, inclined to leak around the covers, and did not admit of easy observation of their contents while churning; they were therefore replaced by wide-mouthed, glass-stoppered bottles of about one quart capacity, which answered the purpose admirably.

Four hundred grams (about fourteen ounces) of milk were found by several preliminary trials to be a suitable quantity for one of these bottles, and this amount was taken in all of the trials given below. The milk, as soon after milking as possible, was brought to the laboratory, strained and thoroughly mixed. A sample was taken for analysis, and as many portions of 400 grams each as were desired for tests were weighed directly in the bottles. These were kept under the conditions of temperature and exposure desired until churned. In every instance the whole milk was churned without being removed from the bottle until the operation was completed. The churning was continued till the butter separated in grains about the size of wheat kernels, when the butter was removed from the churn. The butter was either washed in the bottle, after pouring off the buttermilk, by addition of cold water and shaking, or by first removing the butter and pouring water over it. In all cases the butter was washed till the washings were clear. The butter was worked by pressure with a small ladle, made into a ball, with care not to destroy the grain and weighed, with a balance sensitive to one-tenth of a gram, on a piece of tared filter paper, and after standing exposed to the air at the ordinary temperature of the laboratory (about seventy degrees Fahrenheit) for twenty-four hours weighed again. This last weight of air-dry butter has been taken as the yield from the milk, although the condition of the butter when first weighed would no doubt have been more like that of

butter as weighed in so-called "official" tests, where the butter is simply "washed and weighed." In the test of Ida of St. Lambert by Mr. D. W. Watrous, in September, 1884, the butter was washed three times and weighed within twelve minutes after the buttermilk was removed from the churn, and was finally weighed as salted butter in less than five minutes afterward. It is highly probable that butter treated in this way would contain a larger proportion of water than the small quantity obtained in our tests would after being worked. It is, however, thought best, on account of the more uniform condition of the dry butter, to take this as the true yield. The figures given are in every instance for unsalted butter. The analyses which have been made of this butter show it to contain a large proportion of butter fat and a small proportion of casein, while the water is not high.

The results obtained for the whole period are given in the following table ;

BUTTER TEST OF JEM'S MILK.

DATE.		Per cent of fat in milk.	Time set, hours.	Temp. set, F.°	Temp. churn'd F.°	Time churned, hours.	Per cent of butter.		Per ct. relation of butter to fat in milk.
							Moist.	Dry.	
Sept.	24. Morn.....	7.42	8	75	75	1-2	5.80	5.56	74.9
	24. "	7.42	8	75	75	1-2	5.96	5.60	75.5
	24. "	7.42	8	75	75	1-2	5.88	5.56	74.9
	24. "	7.42	8	75	75	1-2	5.30	5.06	68.2
	25. Eve.....	6.41	14	75	68	1-2	5.68	5.10	79.6
	25. "	6.41	14	75	68	1-2	5.88	5.50	85.8
	26. Morn.....	4.75	8	72	72	1	4.68	4.45	93.6
	26. "	4.75	8	72	72	1	4.68	4.40	92.6
	26. "	4.75	8	72	72	1	4.55	4.35	91.6
	26. "	4.75	8	72	72	1	5.00	4.80	101.1
	29. "	5.37	24	75	64	2	4.77	3.88	72.2
	29. "	5.37	24	75	64	2	4.68	3.82	71.1
	29. "	5.37	24	64	64	2	6.60	5.50	102.4
	29. "	5.37	24	64	64	2	6.42	5.45	101.5
	30. Eve.....	6.44	21	64	64	1	5.20	4.95	76.9
	30. "	6.44	21	64	64	1	5.20	4.87	75.6
	30. "	6.44	21	75	64	1 3-4	2.70	2.45	38.0
	30. "	6.44	21	75	64	1 3-4	2.95	2.72	42.2
Oct.	2. Morn.....	6.11	30	64	64	1 1-4	8.13	7.52	123.1
	2. " ...	6.11	30	64	64	1 1-4	8.78	7.92	129.6
	2. "	6.11	30	68	64	1 1-4	7.63	7.02	114.9
	3. " ...	7.17	30	64	64	1-2	7.78	7.13	99.4
	3. "	7.17	30	64	64	1-2	7.60	7.03	98.
	3. "	7.17	30	68	64	1-2	7.20	6.68	93.1
	3. "	7.17	30	68	64	1-2	7.30	6.88	95.9
	4. "	5.96	48	64	64	1	6.50	6.27	105.4
	4. "	5.96	48	64	64	1	6.30	5.95	99.8
	4. " ...	5.96	48	64	64	1	6.18	5.83	97.8
	4. "	5.96	48	64	64	1	6.30	5.90	99.0
	6. " ...	6.02	36	64	64	2	8.53	7.43	123.4
	6. " ...	6.02	36	64	64	2	8.58	6.58	109.3
	6. "	6.02	36	64	64	2	9.60	7.78	129.2
	6. Eve.....	7.87	36	64	64	1 3-4	9.13	7.90	100.4

BUTTER TEST OF JEM'S MILK — *Continued.*

DATE.			Per cent of fat in milk.	Time set, hours.	Temp. set, F.	Temp. churn'd F.	Time churned, hours.	Per cent of butter.		Per cent. relation of butter to fat in milk.
								Moist.	Dry.	
Oct.	6.	Eve.....	7.87	36	64	64	1 3-4	8.90	7.03	89.3
	6.	"	7.87	36	64	64	1 3-4	9.08	7.72	98.1
	7.	Morn..	7.00	30	64	64	1 1-4	7.63	6.88	98.3
	7.	"	7.00	30	64	64	1 1-4	7.48	6.80	97.1
	7.	"	7.00	30	64	64	1 1-4	7.45	6.80	97.1
	8.	"	5.90	48	64	64	4	6.07	5.85	99.2
	8.	Eve	8.58	36	64	64	3	13.52	12.00	139.9
	8.	"	8.58	36	64	64	3	15.17	14.45	168.4
	9.	Morn....	7.50	54	64	64	1 1-2	9.35	7.80	104.0
	9.	"	7.50	54	64	64	1 1-2	9.92	7.42	99.0
	9.	"	7.50	54	64	64	1 1-2	10.00	8.00	106.7
	10.	"	8.00	72	64	73	1	8.37	7.80	97.5
	10.	"	8.00	72	64	73	1	9.95	8.07	100.9
	10.	"	8.00	72	64	64	4 1-2	11.5	8.65	108.1
	10.	"	8.00	72	64	64	4 1-2	9.80	9.37	107.1
	11.	"	7.19	54	64	70	3-4	3.95	.....	.....
	11.	"	7.19	54	64	70	3-4	4.00	.....	.....
	13.	"	7.22	48	63	70	2	6.87	6.67	92.4
	13.	"	7.22	48	63	70	2	6.95	6.80	94.2
	14.	"	6.87	48	63	70	1 1-2	8.25	7.25	105.5
	14.	"	6.87	48	63	70	1 1-2	8 30	7.87	114.6
	15.	"	6.06	48	63	77	1-2	.....	4.90	80.9
	15.	"	6.06	48	63	77	1-2	5.18	4.70	77.5
	15.	"	6.06	48	68	77	1	3.02	2.83	46.7
	16.	"	7.95	48	63	73	1	7.25	6.87	86.4
	16.	"	7.95	48	73	73	1	3.92	3.78	47.5
	17.	"	6.86	72	73	73	1 1-4	5.57	5.27	76.8
	17.	"	6.86	72	61	73	3-4	4.52	4.37	63.7
	18.	"	5.76	48	61	73	3-4	6.95	6.70	116.3
	18.	"	5.76	48	61	73	3-4	6.95	6.62	115.0
	18.	"	5.76	48	73	73	1 1-4	6.52	6.20	176.0
	18.	"	5.76	48	73	73	1 1-4	6.95	6.70	116.3
	20.	"	9.03	54	73	73	1 1-2	10.57	10.02	110.9
	20.	"	9.03	54	61	73	1-2	8.62	8.27	91.6
	20.	Eve.....	7.64	42	61	73	1-2	7.77	7.50	98.2
	20.	"	7.64	42	61	73	1-2	7.71	7.34	96.1
	21.	Morn. ..	6.45	48	61	75	1 1-2	6.55	6.30	97.7
	21.	"	6.45	48	73	75	1 1-2	7.55	6.78	105.1
	22.	"	6.60	48	73	73	1 1-2	7.07	6.55	99.
	22.	"	6.60	48	61	73	1	7.00	6.60	100.
	23.	"	6.26	48	61	73	1-2	6.78	6.30	100.6
	23.	"	6.26	96	73	73	3	0	0	0
	24.	"	7.15	24	73	73	1 1-2	3.45	2.78	38.9
	24.	"	7.15	72	61	73	1-2	6.23	5.83	81.5
	25.	"	6.22	48	73	73	1-2	5.55	4.92	79.1
	25.	"	6.22	48	59	73	2	6.42	6.02	96.8
	25.	Eve.....	8.11	36	59	73	1-2	7.85	7.42	91.5
	27.	Morn....	8.22	48	59	73	1-2	7.50	7.05	85.8
	27.	"	8.22	48	59	73	1-2	7.20	6.65	80.9
	27.	"	8.22	48	75	71	2	9.20	8.37	101.8
	27.	Eve.....	8.14	48	59	71	1-2	8.07	7.50	92.1
	27.	"	8.14	48	59	71	1-2	8.00	7.30	89.7
	27.	"	8.14	48	75	71	2	9.23	8.13	100.0
	28.	Morn....	6.66	54	59	71	1-2	7.30	6.85	102.9
	28.	"	6.66	54	59	71	1-2	7.30	6.53	98 0
	29.	"	7.69	54	59	71	1-2	8.15	6.87	89.3

BUTTER TEST OF JEM'S MILK — Continued.

DATE.		Per cent of fat in milk.	Time set, hours.	Temp. set, F.	Temp. churn'd F.	Time churned, hours.	Per cent of butter.		Per ct. relation of butter to fat in milk.
							Moist.	Dry.	
Oct.	29. Morn....	7.69	54	59	71	1-2	7.95	7.17	93.2
	30. "	7.30	48	59	71	1-2	8.22	7.25	99.3
	30. "	7.30	48	59	71	1-2	8.02	6.95	95.2
	31. "	8.18	72	59	71	1-3	6.75	6.37	78.0
	31. "	8.18	72	59	71	1-3	7.32	6.50	79.4
Nov.	1. "	8.25	54	59	71	1-3	8.95	7.95	96.4
	1. "	8.25	54	59	71	1-3	9.02	8.10	98.2
	3. "	8.12	54	59	71	1-2	9.32	8.77	108.0
	3. "	8.12	54	59	71	1-2	9.20	8.52	105.0
	4. "	6.75	54	59	71	1-2	9.17	7.92	117.8
	4. "	6.75	54	59	71	1-2	9.00	7.32	108.9
	5. "	8.49	54	54	72	1-2	10.32	9.32	109.8
	5. "	8.49	54	54	72	1-2	10.12	8.90	104.9
	6. "	8.84	54	54	70	1-2	10.80	9.12	103.2
	6. "	8.84	54	54	70	1-2	10.47	9.27	104.9
	6. Eve.....	8.43	44	54	70	1-2	9.47	8.60	102.0
	6. "	8.43	44	54	70	1-2	9.64	8.52	101.1
	7. Morn....	8.86	78	54	68	1-2	10.57	8.80	99.3
	7. "	8.86	78	54	68	1-2	10.40	8.87	100.
	7. Eve.....	8.28	66	54	68	1-2	9.98	8.52	102.9
	7. "	8.28	66	54	68	1-2	9.35	8.38	101.2
	8. Morn ...	9.64	54	54	68	1-2	10.07	8.65	89.7
	8. "	9.64	54	54	68	1-2	9.78	8.52	88.4
	8. Eve.....	6.41	44	54	68	1-2	9.45	8.25	128.7
	8. "	6.41	44	54	68	1-2	9.57	8.18	127.6
	10. Morn....	8.54	54	54	68	1 1-4	12.30	9.87	115.6
	10. "	8.54	54	54	68	1 1-4	10.85	9.18	107.5
	10. Eve.....	8.42	66	54	68	3-4	9.02	8.42	100.
	10. "	8.42	66	54	68	3-4	8.95	8.28	98.3
	11. Morn....	7.42	54	54	68	3-4	8.88	7.98	107.5
	11. "	7.42	54	54	68	3-4	8.92	7.85	105.8
	11. Eve.....	6.92	66	54	72	1 1-2	11.35	7.82	113.
	11. "	6.92	66	54	72	1 1-2	11.07	7.70	111.3
	12. Morn....	7.10	54	54	72	1 3-4	11.02	8.20	115.5
	12. "	7.10	54	54	72	1 3-4	11.37	8.05	113.4
	13. "	6.48	54	54	66	2	8.40	6.78	104.6
	13. "	6.48	54	54	66	2	8.05	6.58	101.5

BUTTER TEST OF MEG'S MILK.

Sept.	25. Eve.....	4.78	14	75	68	1-2	2.38	2.13	44.6
	25. "	4.78	14	75	68	1-2	2.45	2.18	45.6
	26. Morn....	6.64	8	72	72	1	1.82	1.72	25.9
	26. "	6.64	8	72	72	1	1.87	1.75	26.3
	26. "	6.64	8	72	72	1	2.05	1.92	29.0
	26. "	6.64	8	72	72	1	2.00	1.87	28.1
	29. "	4.52	24	75	64	4 1-4	4.02	3.88	85.8
	29. "	4.52	24	75	64	4 1-4	4.12	3.90	86.3
	29. "	4.52	24	64	64	4 1-4	4.05	3.78	83.6
	29. "	4.52	24	64	64	4 1-4	4.15	3.70	81.9
	30. Eve.....	4.38	21	64	64	1 3-4	2.05	1.92	43.8
	30. "	4.38	21	64	64	1 3-4	2.12	1.98	45.2
	30. "	4.38	21	75	64	1 3-4	1.30	1.18	27.0
	30. "	4.38	21	75	64	1 3-4	1.48	1.35	30.8

BUTTER TEST OF MEG'S MILK—Continued.

DATE.			Per cent of fat in milk.	Time set, hours.	Temp. set, F.°	Temp. churn'd F.°	Time churned, hours.	Per cent of butter.		Per cent. relation of butter to fat in milk.
								Moist	Dry.	
Oct.	2.	Morn.	6.77	30	64	64	1 1-4	7.15	7.00	103.4
	2.	"	6.77	30	64	64	1 1-4	7.15	6.95	102.6
	2.	"	6.77	30	68	64	1 1-4	6.58	6.30	93.1
	2.	"	6.77	30	68	64	1 1-4	6.48	6.30	93.1
	3.	"	5.53	30	64	64	1	3.83	3.63	65.6
	3.	"	5.53	30	64	64	1	3.40	3.25	58.8
	3.	"	5.53	30	68	64	1	2.70	2.60	47.0
	3.	"	5.53	30	68	64	1	2.30	2.18	37.6
	4.	"	6.32	48	64	64	1 1-2	6.15	5.73	90.7
	4.	"	6.32	48	64	64	1 1-2	5.98	5.43	86.0
	4.	"	6.32	48	64	64	1 1-2	5.93	5.48	86.7
	4.	"	6.32	48	64	64	1 1-2	5.75	5.40	85.6
	6.	"	10.95	36	64	64	1 1-2	8.68	8.33	76.1
	6.	"	10.95	36	64	64	1 1-2	8.68	8.36	76.3
	6.	Eve.	12.53	36	64	64	3-4	8.43	7.97	63.6
	6.	"	12.53	36	64	64	3-4	8.33	7.83	62.5
	7.	Morn.	7.14	30	64	64	1 1-4	6.20	6.03	84.4
	7.	"	7.14	30	64	64	1 1-4	6.20	6.00	84.0
	7.	"	7.14	30	64	64	1 1-4	6.23	5.95	83.3
	8.	"	5.92	48	64	64	3	4.17	3.75	63.3
	8.	"	5.92	48	64	64	4	3.56	3.40	57.4
	9.	"	4.19	90	64	64	6	3.02	...	...
	9.	"	4.19	90	64	64	6	2.57	2.25	53.7
	9.	"	4.19	90	64	64	6	2.22	1.90	45.3
	10.	"	3.79	78	64	70	3-4	2.67	2.50	66.0
	10.	"	3.79	78	64	70	3-4	3.10	2.92	77.0
	10.	"	3.79	78	64	64	2 1-2	0	0	0
	10.	"	3.79	78	64	64	2 1-2	0	0	0
	11.	"	3.46	54	64	70	5	0	0	0
	11.	"	3.46	54	64	70	5	0	0	0
	13.	"	5.23	48	63	73	2 1-4	4.32	4.15	79.3
	13.	"	5.23	48	63	70	2 1-4	4.67	4.12	78.8
	14.	"	3.96	48	63	77	1 1-4	3.10	2.97	75.0
	14.	"	3.96	48	63	77	1 1-4	3.02	2.92	73.7
	14.	"	3.96	48	63	75	1 1-4	2.82	2.62	66.2
	14.	"	3.96	48	63	75	1 1-4	2.55	2.37	60.0
	15.	"	2.74	48	63	77	1 1-2	1.25	1.25	45.6
	15.	"	2.74	48	63	77	1 1-2	1.25	1.22	44.5
	15.	"	2.74	48	68	77	1	1.52	1.30	47.5
	15.	"	2.74	48	68	77	1	1.25	1.20	44.0
	16.	"	4.78	48	63	73	1 3-4	2.70	2.57	53.8
	16.	"	4.78	48	73	73	1 3-4	3.12	2.82	59.0
	16.	"	4.78	48	73	73	1 3-4	2.87	2.65	55.4
	17.	"	3.75	72	61	73	2	1.22	1.12	29.9
	17.	"	3.75	72	73	73	1 1-2	2.27	2.12	56.5
	18.	"	4.69	48	73	73	1 1-2	3.75	3.57	76.1
	18.	"	4.69	48	61	73	3-4	3.12	2.92	62.3
	18.	"	4.69	48	61	73	1 1-4	3.17	3.02	64.4
	20.	"	4.55	54	61	73	1 1-4	3.77	3.33	73.2
	20.	"	4.55	54	61	73	1 1-4	4.15	3.53	77.6
	20.	"	4.55	54	73	73	2 1-2	3.37	3.27	71.7
	20.	"	4.55	54	73	73	2 1-2	3.33	3.07	65.2
	21.	"	4.41	48	61	75	1 1-2	3.65	3.37	76.4
	21.	"	4.41	48	73	75	10	0	0	0
	22.	"	4.54	48	73	73	4	0	0	0

BUTTER TEST OF MEG'S MILK — *Continued.*

DATE.		Per cent of fat in milk.	Time set, hours	Temp. set, F.°	Temp. churn'd F.°	Time churn'd, hours.	Per cent of butter.		Per ct relation of butter to fat in milk.
							Moist.	Dry.	
Oct.	22. Morn.	4.54	48	61	73	1 1-2	3.50	3.37	74 2
	23. " . . .	4 49	24	61	73	1 1-2	3.75	3.57	79 5
	23. " . . .	4.49	24	73	73	4	2.45	3.07	46.1
	24. " . . .	4 08	72	61	73	3 4	1.62	1.55	38.0
	24. " . . .	4 03	72	73	73	3	0	0	0
	25. "	3.98	48	73	73	1-2	3.10	2.63	66.8
	25. "	3 98	48	59	73	2	2.40	2.00	50.3
	25. Eve.	4.49	36	59	73	1-2	2 92	2.65	59 0
	27. Morn. . .	4.91	48	59	73	1-2	3.57	3.00	61 1
	27. " . . .	4.91	48	73	73	2	4.25	3.42	69.6
	28. " . . .	4.42	54	59	73	1	4 17	3.70	83.7
	28. " . . .	4 42	54	59	73	1	4.57	3.75	84.8
	28. "	4.42	54	73	73	3	0	0	0
	29. " . . .	4.36	54	59	73	3-4	4.12	3.37	77.3
	29. " . . .	4.36	54	59	73	3-4	4.05	3 35	76.9
	30. "	4 49	48	59	73	3-4	4.87	3 82	85.1
	30. "	4.49	48	59	73	3-4	4.80	3.82	85.1
	31. "	4.21	72	59	73	3-4	2.82	2.60	61.7
	31. "	4.21	72	59	73	3-4	2.82	2.60	61 7
Nov.	1. " . . .	4.79	54	59	73	1	4.32	4.00	83 5
	1. "	4.79	54	59	73	1	4.17	3.82	79.7
	3. " . . .	5 54	54	59	73	3-4	4.87	4.47	80.7
	3. " . . .	5.54	54	59	73	3-4	4.77	4.32	77 9
	4. " . . .	4.88	54	59	73	1 1-2	5 07	4.52	92.6
	4. "	4 88	54	59	73	1 1-2	5.10	4.45	91.2
	5. " . . .	5.84	54	54	72	1	6 85	5.90	101.
	5. " . . .	5.84	54	54	72	1	7 05	5.82	99.7
	6. " . . .	5 07	54	54	70	3-4	5.92	5.12	101.
	6. " . . .	5 07	54	54	70	3-4	5.80	5.30	104 5
	7. "	5.33	78	54	68	3-4	5.60	5 07	95.1
	7. "	5.33	78	54	68	3-4	5.62	5.15	96.6
	8. "	4.98	54	54	68	3-4	5 15	4.62	92.8
	8. " . . .	4.98	54	54	68	3-4	5.15	4.58	92.0
	10. "	5.41	54	54	70	1 1-4	6.18	5.35	99.0
	10. "	5.41	54	54	70	1 1-4	6.45	5.40	99.8
	11. " . . .	5 c6	54	54	70	3-4	5.20	4.75	93.8
	11. "	5.c6	54	54	70	3-4	5.22	4.80	94.8
	12. "	5.20	54	54	72	1 3-4	6.25	5.32	102 3
	12. "	5 20	54	54	72	1 3-4	5 62	5.15	99 0
	13. " . . .	4.77	54	54	66	2	5.92	4.52	94 8
	13. "	4.77	54	54	66	2	5 78	4.49	93.3

In thirty-seven trials with Jem's milk, two or more samples of the same milk were subjected to the same treatment throughout. The average of the lowest figures obtained in these cases is 6.57 per cent, and the average of the highest figures is 6.88 per cent, giving an average variation for all duplicates with Jem's milk of 0.31 per cent. There were twenty-three cases in which the variation was less than .3 per cent, and twenty-one cases in which the variation was less than .2 per cent. Rejecting the five cases in which the greatest differences occurred we have an average variation between duplicates, in thirty-two trials of .2 per cent.

In thirty duplicates with Meg's milk we have the average of the lowest figures 3.33 per cent, and of the highest figures 3.46 per cent, giving an average variation of .13 per cent, for Meg's milk. There were four cases in which the variation was above .3 per cent. The general results with Meg's milk have agreed nearly as well as would duplicate determinations of fat.

It will be seen that the results obtained from Jem's milk have been much less uniform than those obtained from Meg's. This would hardly have been expected, as Jem's milk has throughout the whole period churned to better advantage and produced a much finer quality of butter than has Meg's. Jem's butter has with only one or two exceptions been of good color, of firm texture, and of fine grain. Meg's has usually been soft, often greasy and of poor color, and almost without exception the buttermilk from Meg's has contained more fat than that from Jem's.

The economy of each milk for butter purposes is shown by the relation between the fat in the milk and the butter obtained. The figures expressing this are given in the last column of the above table, in which the fat in the milk is taken as 100. The average of these figures for the whole period is for Jem 95 per cent, and for Meg 66 per cent, showing that Jem produced about 50 per cent more butter than Meg for the same amount of fat in the milk. Leaving out the results of the first week, which owing to inexperience in churning, were much below the average, the yield of air dry butter from Jem's milk was a trifling more than the per cent of fat in the milk. The result for Meg was much below this.

The difference between the two cows becomes still more prominent if we consider the number of pounds of each cow's milk required to make one pound of butter. The average number of pounds of Jem's milk was 14.4, and of Meg's 29. A part of this difference can be attributed to the superior richness of Jem's milk, but the better churning qualities of her milk seems to have had the greater influence. At those times when Jem's milk was no richer than Meg's, she still made considerably more butter, as is shown below:

	Jem. Per cent.		Meg. Per cent.		Difference in favor of Jem.
	Fat in milk.	Butter.	Fat in milk.	Butter.	
October 2....	6.11	7.48	6.77	6.64	.84
October 7....	7.00	6.83	7.14	6.00	.83
October 8....	5.90	5.85	5.92	3.57	2.28

Not only is the percentage of butter larger with Jem than with Meg, but the absolute amount of butter made from Jem's milk during the period was larger; on the other hand Meg produced considerably more milk than Jem. The yield of milk for the fifty-six days of the trial was, for Jem 365.6 lbs., and for Meg 550.4 lbs.

Taking the average percentage of butter yielded from the milk of each cow we have of butter produced from Jem's milk 25.5 lbs. and from Meg's milk 18.76 lbs.

The influence of the quality of the milk on the economy of churning is shown by comparing the yield of butter from the richest milk of each cow with their average yield. Seventy-two trials made with Jem's milk when the percentage of fat was above 7, gave an average percentage ratio of butter to fat in milk of 96., the average for the whole period being 95. In thirty-seven trials when the fat was above 8 per cent, the average ratio of butter to fat was 101.9.

With Meg's milk, forty-one trials when the percentage of fat was above five, gave an average ratio of butter to fat of 78.3, the average for the period being 66.

In both cases we find that a larger proportion of the butter was recovered from rich milk than from poor. The amount of fat retained in the buttermilk is probably about the same with rich as with poor milk, but the effect of this loss on the percentage of butter obtained is greater with the milk containing the least fat.

Influence of time of setting on the yield of Butter:

Jem.								
24 hours and under.			24 to 48 hours.			Over 48 hours.		
Hours set.	Per cent of butter.	Ratio of butter to fat in milk.	Hours set.	Per cent of butter.	Ratio of butter to fat in milk.	Hours set.	Per cent of butter.	Ratio of butter to fat in milk.
8	5.44	73.5	30	7.48	122.5	54	7.74	103.2
8	4.50	92.1	30	6.93	96.6	54	6.69	100.5
14	5.30	82.7	30	6.83	97.5	54	7.02	91.2
21	3.75	58.2	36	7.26	120.6	54	8.02	103.1
24	2.78	38.9	36	7.55	95.9	54	8.64	106.5
24	4.62	86.8	36	13.22	159.1	54	7.62	113.3
..	.....	.....	36	7.42	91.5	54	9.11	107.3
..	.....	.....	42	7.42	97.1	54	9.19	104.0
..	.....	.....	44	8.56	101.5	54	8.58	89.
..	.....	.....	44	8.21	128.1	54	9.52	111.5
..	.....	.....	48	5.99	100.5	54	7.91	106.6
..	.....	.....	48	5.85	99.2	54	8.12	114.4
..	.....	.....	48	6.73	93.3	54	6.64	103.0
..	.....	.....	48	7.56	111.0	66	8.35	99.1
..	.....	.....	48	4.11	62.1	66	8.35	102.0
..	.....	.....	48	6.55	113.8	66	7.76	112.1
..	.....	.....	48	6.54	104.4	72	8.47	105.9
..	.....	.....	48	6.62	99.5	72	4.82	70.2
..	.....	.....	48	6.30	100.6	72	9.14	101.2
..	.....	.....	48	5.47	87.9	72	6.43	78.7
..	.....	.....	48	7.36	89.5	72	5.83	81.5
..	.....	.....	48	7.64	93.9	78	8.83	99.6
..	.....	.....	48	7.10	97.2	96	0	0
Average	72.....	102.6.....						95.8

Influence of the time of setting on the vield of butter

Meg.								
24 hours and under.			24 to 48 hours.			Over 48 hours		
Hours set.	Per cent of butter.	Ratio of butter to fat in milk.	Hours set.	Per cent of butter.	Ratio of butter to fat in milk.	Hours set.	Per cent of butter.	Ratio of butter to fat in milk.
8	1.82	27.4	30	6.64	98	54	0	0
14	2.15	45.6	30	2.92	52.5	54	4.40	71.9
21	1.61	36.7	30	6.00	83.9	54	2.48	56.2
24	3.81	84.4	36	8.34	76.2	54	3.36	77.1
24	2.82	62.8	36	7.90	63.0	54	3.91	81.6
..	...	...	36	2.65	59.0	54	4.39	79.3
..	...	...	48	5.51	87.2	54	4.48	91.9
..	...	...	48	3.57	65.3	54	4.86	100.3
..	...	...	48	4.13	79.	54	5.21	102.7
..	...	...	48	2.72	68.7	54	4.60	92.4
..	...	...	48	1.24	45.4	54	3.37	99.4
..	...	...	48	2.68	56.1	54	4.77	94.3
..	...	...	48	3.17	67.6	54	5.23	100.6
..	...	...	48	1.68	38.2	54	4.48	94.0
..	...	...	48	1.68	37.1	72	1.62	43.2
..	...	...	48	2.31	58.5	72	.77	19
..	...	...	48	3.21	65.3	72	2.65	61.7
..	...	...	48	3.82	85.1	78	2.71	71.
..	...	...	..	...	...	78	5.11	95.8
..	...	...	..	...	...	90	2.58	57
Average.....			51.4.....	65.6.....			74.5	

It appears from this table that the time of setting most favorable to butter yield is for both cows from forty-eight to fifty-four hours and that much departure from this time in either direction has occasioned a decrease in the quantity of butter obtained.

The effect of temperature of setting is shown in the table below, in which are arranged all results from samples of the same milk set warm and cold. Those set warm were kept on a table in the laboratory and were, therefore, at the temperature of the room about 70°. Those set cold were kept in a sink with spring water running around them; the temperature of the water varied from 66° F at the beginning of the experiment to 54° at the end.

Jem's Milk

SET WARM.			SET COLD		
Temp set. F.°	Per cent of Butter.	Ratio of But- ter to fat in milk.	Temp. set.	Per cent of Butter	Ratio of Butter to fat in milk.
75	3.85	71.6	64	5.47	102.
75	2.58	40.1	64	4.91	76.2
68	7.02	114.9	64	7.72	126.3
68	2.78	94.5	64	7.08	98.7
68	2.83	46.7	63	4.80	79.2
73	5.27	6.8	61	4.37	63.7
73	3.78	47.5	63	6.87	86.4
73	10.02	110.9	61	8.27	91.6
73	6.66	105.1	61	6.30	97.7
73	0.	0.	61	6.45	100.3
73	2.78	38.9	61	5.83	81.5
73	4.92	79.1	59	6.02	96.8
73	8.37	101.8	59	6.85	83.3
75	8 13	100.	59	7.40	90.9
Average.	5.21	73.4	....	6.31	91.0

Megs Milk.

SET WARM.			SET COLD.		
Temp. set.	Per cent of Butter.	Ratio of Butter to fat in milk.	Temp. set	Per cent of Butter.	Ratio of Butter to fat in milk.
75	3.89	86.0	64	3.74	82.7
75	1.26	28.9	64	1.95	44.5
68	6.30	93.1	64	6.97	103.
68	2.39	41.7	64	3.44	62.2
68	1.25	45.0	63	1.24	45.7
73	2.73	57.2	63	2.57	53.8
73	2.12	56.5	61	1.12	29.9
73	3.57	76.1	61	2.96	63.3
73	3.17	68.4	61	3.43	75.4
73	0.	0.	61	3.37	76.4
73	0.	0.	61	3.37	74.2
73	2.07	46.1	61	3.57	79.5
73	0.	0.	61	1.55	38.0
73	2.63	66.8	59	2.00	50.3
73	3.43	69.6	59	3.00	61.1
73	0.	0.	59	3.72	84.0
Average.	2.17	45.9	....	3.00	64.0

We learn from this that there has been a marked difference in favor of the cooler setting with the milk of both cows.

During the last few days of the trial the test samples were all set in the spring water, one bottle in each case being closed and the other left open exposed freely to the air. No difference was observed in the ease of churning the two samples nor in the appearance of the butter obtained, while the quantity obtained was almost identical in the two cases. The average per cent of butter obtained from Jem's milk in sixteen trials was in the open bottles 7.98 and in the closed 7.88.

In fifteen trials with Meg's milk the average was in the open bottles 4.48 and in the closed ones 4.45.

The melting point of the butter obtained was determined frequently and was found to be quite constant throughout the whole period. That from Jem's milk varied only one or two degrees from 104° F. That from Meg's milk was considerably lower, being in nearly every trial 96° F.

Five partial analyses of the air-dried butter from Jem's milk were made. These are given below :

Date when churned	Water.	Fat.	Casein and ash by difference.	Insoluble fatty acids.
October 25. Evening.....	16.09	82.88	1.03	
October 27. Morning.....	16.09	82.42	1.49	
November 3. Morning	16.14	82.70	1.16	
November 7. Morning	13.49	84.83	1.68	86.86
November 10. Morning	14.40	84.12	1.48	
Average	15.24	83.39	1.37	

The average loss of the butter from Jem's milk by air drying was 10.7 per cent; calculated on this basis the average composition of the moist butter from her milk would be.

Water.	Fat.	Casein, etc
24.31	74.47	1.22

MILK.

The average composition of the milk from the two Jersey cows, Jem and Meg, during the feeding experiments in January and February, 1884, and with brewers' grains in October and November of the same year, is given below.

Jem is four years old and Meg is six years old. Further particulars regarding these cows will be found in report on brewers' grains.

Average composition of Jem's milk.

1884 Jan. and Feb.	Number of determinations.	Highest.	Lowest.	Average.
Specific gravity	75	1.0360	1.0295	1.0314
Solids	76	16.10	12.89	14.76
Fat	76	6.80	3.36	5.26
Casein	24	3.75	2.85	3.47
Sugar	14	5.91	4.97	5.26
Ash	22	.77	.60	.71
Oct and Nov.				
Specific gravity	78	1.0357	1.0280	1.0310
Solids	56	19.50	13.50	17.03
Fat	54	9.64	4.75	7.42
Casein	8	4.37	3.36	4.07
Sugar	8	5.78	4.20	5.01
Ash	10	.78	.58	.68

Average composition of Meg's milk.

1884. Jan. and Feb.	Number of determinations.	Highest.	Lowest.	Average.
Specific gravity.....	40	1.0363	1.0315	1.0337
Solids	39	16.27	12.99	14.34
Fat	40	6.43	3.49	4.65
Casein	23	4.11	3.48	3.73
Sugar	12	5.44	4.80	5.10
Ash	21	.77	.60	.71
Oct. and Nov.				
Specific gravity.....	77	1.0376	1.0253	1.0315
Solids	48	21.43	12.35	14.39
Fat	48	12.53*	2.74	5.20
Casein	6	3.80	3.54	3.76
Sugar	6	5.84	4.41	4.90
Ash	9	.74	.51	.66

The average of the analysis for the morning's and evening's milk of each period is as below :

Jem.

1884. Jan. and Feb.	Specific gravity	Solids.	Fat.
Morning.....	1.0337	14.33	5.02
Evening	1.0318	15.22	5.80
Oct. and Nov.			
Morning.....	1.0309	16.80	7.33
Evening	1.0311	17.01	7.65

Meg.

1884. Jan. and Feb.			
Morning.....	1.0347	13.99	4.27
Evening.....	1.0327	14.76	5.08
Oct. and Nov.			
Morning.....	1.0321	14.61	4.91
Evening	1.0326	15.52	6.42

The average difference between the morning's and evening's milk of Meg in October and November is not as great as appears from these figures, as the nine determinations made of the evening's milk included some of the phenomenal yields.

The average composition of the milk from our herd of four Jersey cows during the feeding experiment in 1883 is repeated from last year's report :

	Number of de- terminations.	Highest.	Lowest.	Average.
Specific gravity.....	94	1.0336	1.0296	1.0315
Cream	94	17.5	10.	13.80
Solid	94	15.90	13.26	14.47
Fat	47	6.02	4.47	5.09
Casein	40	3.93	3.25	3.57
Sugar	40	5.56	4.64	5.15
Ash	47	.74	.56	.67

* See remarks on phenomenal milk

The variations between the morning's and evening's milk is shown in the following table which represents the average of all determination made :

	Spec. grav	Cream.	Solids.	Fat
Morning	1.0320	12.74	14.20	4.83
Evening	1.0309	14.86	14.74	5.66

Cream.

Two analyses of cream have been made with the following results :

	Spec. grav	Solids.	Fat.
February 22, 1884 .....	.9887	60.51	54.70
October 13, 1884 .....	....	37.76	30.67

The last sample was churned and yielded 35.6 per cent of the weight of the cream in unsalted butter.

LYSIMETER.

Since January 1, 1883, monthly examinations of the drainage water from the three lysimeters, described in the First Annual Report of this Station, page 14, have been made. These observations are not yet sufficiently numerous to admit of any extended discussions regarding the amount of plant food lost in the drainage water, but it is deemed best to put upon record the results already obtained.

The treatment of the soil in each lysimeter has been the same since they were placed in position, viz.: No. 1 is covered with sod, the grass being kept short by frequent cuttings. No. 2 is kept free from all vegetation, its surface being left undisturbed. The surface of No. 3 is kept in a loose and fine condition by frequent stirrings with a trowel.

During the first year, 1883, the water from all of the lysimeters was mixed and analyzed together; since January, 1884, the water from each has been examined separately. The determinations made have been total solids, chlorine, nitrogen in free ammonia and in nitrates. The results thus far obtained are given below, those recorded in the last report being repeated here.

1882. .	Rainfall Inches.	No. of days rain- fall recorded.	Lysimeter Water Collected from		
			Sod. Inches.	Bare soil. Inches.	Cultivated soil. Inches.
August.....	2.371	10	.000	.135	.575
September.....	1.251	6	.000	.001	.284
October.....	0.621	7	.000	.000	.001
November.....	1.220	7	.000	.009	.011
December.....	0.550	4	.000	.271	.249

1883.	Lysimeter Water Collected from				
	Rainfall. Inches.	No. of days rain- fall recorded.	Cultivated		
			Sod. Inches	Bare soil. Inches.	soil. Inches.
January	0.482	13	.007	.052	.006
February	1.441	13	.142	.000	.000
March	0.880	12	.001	.001	.001
April	1.580	11	.001	1.291	1.566
May	4.451	16	1.204	2.439	3.010
June	4.120	12	1.204	1.151	2.154
July	2.980	13	.006	.320	.469
August	3.470	9	.000	.959	1.352
September	2.120	10	.000	.227	.632
October	2.100	10	.083	.964	1.353
November	1.540	5	.935	.801	.935
December	0.730	11	.165	.043	.031
1884.					
January	1.83	11	.059	.229	.055
February	2.01	14	2.062	1.540	1.769
March	2.54	16	1.320	1.629	1.611
April	0.83	11	.190	.062	.210
May	2.49	15	.000	.510	1.070
June	2.01	10	.015	.228	.090
July	2.33	12	.000	.278	.316
August	1.44	6	.000	.000	.000
September	3.17	7	.000	.103	.350
October	1.67	13	.000	.157	.165
November	1.01	8	.000	.000	.000
December	0.97	10	.000	.432	.352

The rainfall and drainage water for each lysimeter is given in the following table in tons of 2000 pounds per acre, the weight of a cubic inch of water being taken as .036024 pounds.

1882.	Tons per acre			
	Rainfall.	Drainage water.		
		Sod.	Bare soil.	Cultivated soil.
August	267.88	.0	15.25	64.96
September	141.34	.0	.11	32.08
October	70.16	.0	.0	.11
November	137.89	.0	1.01	1.24
December	62.14	.0	30.61	28.13
1883.				
January	54.45	.74	5.87	.68
February	162.81	16.04	.0	.0

Tons per acre.				
Drainage water.				
1883	Rainfall.	Sod.	Bare soil.	Cultivated soil.
March	99.42	11	.11	.11
April.....	178.51	.11	145.86	176.93
May.....	502.88	136.03	275.56	340.08
June.....	465.49	136.03	130.04	243.36
July.....	336.64	.67	36.15	52.99
August.. .	392.05	.0	108.35	152.75
September.....	239.52	.0	25.64	71.40
October.....	237.26	9.37	108.91	152.81
November.....	173.99	105.14	90.49	105.64
December	82.47	18.64	4.86	3.50

884.				
January.....	206.78	6.67	25.87	6.21
February.....	227.09	232.97	173.99	199.87
March.....	286.97	149.13	184.04	182.01
April.....	93.77	214.66	7.00	23.70
May.....	281.32	.0	57.62	120.89
June.....	227.09	1.70	25.76	10.17
July.....	263.25	.0	31.41	35.70
August.....	162.64	.0	.0	.0
September.....	358.15	.0	11.63	39.54
October.....	188.68	.0	17.73	18.64
November.....	114.11	.0	.0	.0
December	109.59	.0	48.81	39.77

The amount of solids, chlorine and nitrogen found in the mixed drainage water from the three lysimeters in 1883 and in the water from each lysimeter in 1884 is given below.

Drainage water from the three lysimeters :

1883.	Total solids, grains per gal.	Chlorine, grains per gal.	Nitrogen as free ammonia, parts per million.	Nitrogen as nitrates, parts per million.	Total nitrogen, parts per million.
Jan. 1—Feb. 6...	11.9	1.68	.206	2.76	2.966
Feb. 6—Apr. 16..	46.7	3.36	1.029	55.94	56.969
Apr. 16—May 20.	26.9	2.59	.987	24.73	25.717
May 20—June 1.	38.8	3.71	.165	47.96	48.125
June.....	40.18	3.15	.428	55.90	56.328
July	44.24	3.3	.066	66.00	66.066
August.....	56.35	2.9	.330	97.00	97.330
September	47.95	2.5	.023	83.26	83.286
October	49.91	2.5	.066	92.26	92.326
November	37.73	3.2	.082	64.96	65.042
December	23.59	2.4	.132	25.24	25.253

Drainage from lysimeter No. 1, in sod :

1884.	Total solids, grains per gal.	Chlorine, grains per gal.	Nitrogen as free ammonia, parts per million.	Nitrogen as nitrates, parts per million.	Total nitrogen, parts per million.	Total loss of nitrogen in pounds per acre.
January.....	23.03	1.8	.0033	2.13	2.133	.02844
February....	9.52	1.7	.033	.142	.175	.08154
March.....	10.92	1.5	.079	.142	.221	.06591
April.....	10.43	1.2	.099	.284	.383	.01644
May.....	...	..	....	....	....	....
June.....	....	..	....	....	....	....
July.....	....	..	....	....	....	....
August.....	....	..	....	....	....	....
September...	....	..	....	....	....	....
October.....	....	..	....	....	....	....
November...	....	..	....	....	....	....
December. .	....	..	....	....	....	....

Lysimeter No. 2, bare soil :

January...	15.4	.1	.03	trace	.03	.00155
February..	19.11	1.2	.0132	20.529	20.542	7.1488
March.....	53.06	3.4	.0494	75.073	75.122	27.6524
April.....	46.97	4.7	.0987	90.02	90.119	1.2625
May.....	74.34	4.8	.395	117.92	118.315	13.6350
June.....	32.76	1.1	.0165	33.122	33.138	1.7073
July.....	42.77	1.5	.0296	34.80	34.829	2.1879
August....	....	..	....	....	....	....
September.	42.	3.6	.204	64.62	64.87	1.5087
October...	63.14	5.2	.03	90.86	90.90	3.2244
November..	....	..	....	....	....	....
December..	70.42	4.5	.211	114.58	114.79	11.206

Lysimeter No. 3, cultivated soil :

January....	39.00	1.75	.03	.426	.456	.00566
February...	45.43	.9	.0132	69.61	69.623	27.8307
March.....	31.50	.8	.0494	52.164	52.213	19.0073
April.....	34.44	1.3	.296	65.62	65.916	3.1279
May.....	45.08	.9	.059	68.07	68.129	16.4725
June.....	31.78	.8	.023	23.94	23.963	48.4873
July.....	56.35	.9	.013	63.94	63.953	4.5666
August....	....	..	....	....	....	....
September..	46.90	1.	.0	69.60	69.60	5.5045
October....	53.97	1.	.006	59.66	59.658	2.2246
November...	....	..	....	....	....	....
December...	44.73	.9	.064	62.97	63.03	5.0134

These results show that there is practically no loss of nitrogen in the drainage water from the lysimeter in grass. The loss is very large from the bare soil and still larger from the cultivated.

SORGHUM.

The season of 1884 seemed very unfavorable to the growth and maturity of sorghum. A large plat was planted May 26 with seed of the Early Amber variety supplied by Prof. Henry of the University of Wisconsin, samples of the same seed being sent to several of the experiment stations in order that the results obtained, with the same variety, in different sections, might be comparable. This cane was very backward throughout the season, and when killed by frost, October 15, much of it was still in bloom, and only a few stalks, evidently of a variety earlier than the most of the plat, could be found whose seed was in the dough. These earlier stalks were tested October 7, and again October 14. On October 15, a severe freeze having occurred the night before, a fair average of the cane was taken from each half of the plat and tested. The following results were obtained in the tests made :

EARLY AMBER CANE.

1884.	Average length of cane.	Average weight of stripped cane, grams.	Per cent of juice.	Sp. gr. of juice.	Per cent of cane sugar by polariscope.	Per cent of glucose.	Total Sugar
Oct. 7*.....	6½	276	45.3	1.056	8.29	.....	.....
" 14*.....	7	261	44.5	1.056	7.91	3.80	11.71
" 15†.....	7½	336	45.	1.053	7.44	3.54	10.98
" 15‡.....	7¾	412	46.5	1.053	7.64	4.21	11.85

* Earliest stalks in plat.
† Average stalks from west half of plat.
‡ Average stalks from east half of plat.

Two samples of Niagara cane, one raised from ripe seed, and the other from unripe seed, were tested October 14. The samples from unripe seed were a little more advanced than that from the ripe seed, and the results obtained show it to be a little richer in cane sugar, the total sugar being practically the same in both cases.

1884.	Average length of cane.	Average weight of stripped cane, grams.	Per cent of juice.	Sp. gr. of juice.	Per cent of cane sugar by polariscope.	Per cent of glucose.	Total sugar
Oct 14*.....	7	316	39.2	1.076	11.96	2.22	14.18
" 14†.....	7¾	347	41.1	1.076	11.10	3.10	14.20

* From ripe seed.
† From unripe seed

FERTILIZER.

The examination of fertilizers has, as heretofore, received but little attention, only a limited number of analyses having been made, and these, without exception, have been undertaken for the accommodation of private parties. A list of these analyses is given :

NAME.	PHOSPHORIC ACID.				K. O.		MANUFACTURER.
	Soluble.	Reverted.	Insoluble.	Total.	Potassa.	N. H. ₃ Ammonia.	
Alkaline Bone.....	5.73	1.91	4.88	12.52	3.62	....	Maryland Fert. Co.
Standard Ammon. Bone Phosphate.	5.70	1.00	2.79	9.49	1.99	1.07	Farmers Fert. Co.
Honest Fertilizer.....	6.97	1.44	1.59	10.00	1.42	3.43	L. L. Crocker.
Bowker's Alkaline Bone	9.12	2.11	2.06	13.29	4.61	....	Bowker Fert. Co.
Chesapeake Alkaline Bone.	5.02	2.27	2.47	9.76	3.56	....	Chesapeake Guano Co.
Chesapeake Ammoniated Bone Superphosphate....	5.88	2.00	4.64	12.52	53	1.04	Chesapeake Guano Co.
Pure Bone Meal. ....	....	....	....	18.46	....	4.50	Williams, Clarke & Co.
Ammon. Dissolved Bone...	6.58	3.43	1.82	11.83	....	1.98	Williams, Clarke & Co.
Ammon. Dissolved Bone...	6.82	2.82	1.44	11.08	2.10	2.40	Lister Bros.
Muriate of Potash .....	....	....	....	....	54.71	....
Muriate of Potash .....	....	....	....	....	52.03	....
Wood Ashes. ....	....	....	....	2.65	4.92	....	From tile kiln.

REPORT OF THE BOTANIST.

The work of this department has been largely directed to the investigation of the diseases of plants, and it is only on this subject that it seems necessary to make a formal report. Some interesting physiological investigations are under way, but are not yet complete enough to be published.

The subject of plant diseases is so broad, of such commanding importance, and one so little understood by cultivators that instead of concentrating the work upon a few examples it seemed that the most good could be accomplished by making observations upon any and all, as they came to hand. In pursuance of this plan whenever a disease appeared upon the grounds of the Station or in the neighborhood, it was subjected to observation and experiment, and as completely studied as time and facilities permitted. The report, therefore, only treats of such diseases as have thrust themselves upon our attention, and only such of these, moreover, as became specially conspicuous or yielded the best returns for our labor. It is hoped that those who have occasion to consult this report will bear in mind that it is only the result of a single season's work, and that a complete and wholly satisfactory presentation is by no means possible in so limited time.

Judging from the comments upon fungous diseases which the writer has now and then seen in the agricultural and horticultural papers of the day, a short introductory statement of the relation of fungi to diseases in plants will not be superfluous.

Fungi, like other plants having no green coloring matter, chlorophyll (and let us bear in mind that fungi are amenable to the same general laws that govern other kinds of vegetation), may be divided into two physiological classes, saprophytes and parasites; the former live upon lifeless organic matter, and the latter upon living matter. Many of the moulds, toadstools and other sorts, with which we have little to do in this report, are of the first class. To this class also belong some which do not wait for plants to die, but, with most unseemly haste, begin feeding upon them while yet alive, and then complete their development upon the dead and putrefying bodies which they have helped to destroy; such are many of the rots, as those of the potato, tomato, and of many fruits. From such saprophytes, which begin their work of destruction before the plant is dead, there are all gradations to the completely parasitic fungi

which take their nourishment from the living host, without killing it, and in some cases without interfering with its functions, like many of the mildews, rusts, peach curl, etc.

Probably those most to be dreaded are the half-saprophytic kinds. They may grow for some time in the host before killing the tissues and beginning the work of disintegration. In this case there is a struggle between the fungus and its host. The fungus requires a certain grade or quality of food, it must be, we will say, not above a certain degree of vitality; if the vigor of the host can be raised to exceed this point, the fungus is successfully repulsed, and the disease overcome. Again, in other instances, the fungus having a different habit of life, finds a foothold at some weakened part, as upon old leaves, a sickly branch, or through a wound, and by slowly diverting the nourishment of the plant to its own uses, finally lowers the vitality until it invades and destroys the whole plant. But some fungi are more aggressive than either of these, and at once strike at the most highly vitalized parts of the plant, blasting the tissues wherever they touch. It would be folly to fight such a disease simply by enhancing the vigor of the plant, for this is only providing the fungus with a better supply of the nourishment which it prefers. No more foundation exists for the belief that a fungus cannot successfully attack a healthy plant, than that a well man cannot be made sick by a contagious disease. If we admit, as is most likely true that these saprophytes are helped in their work of disorganization by bacteria, especially the kinds that most quickly kill the host, such as the rots, the facts are not materially changed, for in this case the bacteria without the assistance of the fungus would have no power to break down the tissues.

This brings us to the consideration of true parasitic fungi. If we select for an example such a fungus as the lilac mildew (*Microspæra Friesii* Lev.), which causes the upper surface of lilac leaves to turn white in late summer, we shall have to do with a fungus which completes its growth upon a living host, from which it draws its nourishment, and with so little disturbance to the normal functions that one can scarcely call it a disease. In the nearly related pea and hop mildews the hosts are usually unable to supply sufficient nourishment for both host and parasite, and the host, in consequence, fails to develop fully. In the cases just mentioned the parasite lives wholly upon the outside of the plant, but it is quite as common to find it penetrating the tissues, and living inside. A simple case in point is the peach curl. The mycelium of the fungus causing this disease ramifies through the tissues of the leaves and young shoots of the tree, and makes itself almost a part of them. There is no marked disturbance of functions till the fungus begins to fruit, causing the leaves to become hypertrophied, to ripen prematurely and fall away; but the part of the fungus remaining in the tree lives on perennially. It is only when the tree is unable to meet the full demand for nourishment that we see any lowering of vigor.

We have thus seen that many fungi live upon dead plants, others take an active part in killing the plants in order to feed upon the dying tissues, while others live upon the outside or occupy the inside of the host without causing further harm than using part of the plant's nourishment. Between these forms there are all gradations.

A few words regarding the structure of fungi and their modes of reproduction may be prized by those unfamiliar with the subject. Fungi are plants of simple organization, but yet of as great diversity of structure and habit as is found in the larger plants that fill up a landscape. They are often spoken of as one would speak of the cabbage family, for instance, but there is really no such close relationship, they should rather be considered as varying from each other as much as do the various kinds of trees and herbs.

The body of the fungus is composed of branching threads, except in bacteria, and a few other cases, where the threads, if they may be so called, are unbranched and extremely short. These threads taken together are known as mycelium. Sometimes the mycelium is compacted into a solid body of definite form, as in mushrooms, ergot, etc., but quite as often it remains as loose tangled threads.

All fungi produce spores. These are minute bodies consisting essentially of a single cell, having some direct office in the reproduction of the species. Sometimes the spores are compounded by several cells being united. They may be globular or any other shape. They usually grow at last into another individual, that is, they are really seeds in function, except some of them which are only the male element in the sexual reproduction. Of this latter kind are the pollen grains or pollen spores* of flowering plants, which are as truly spores as the spores of ferns, or of corn smut. There are many kinds of spores designated by names usually formed by putting a prefix before the word spore, for example pollenspore, ascospore, uredospore, etc.

Some fungi like some weeds are able to grow and fruit whenever circumstances are favorable, but the majority have their appointed seasons as much as trees and herbs. Some produce but one kind of spores, as peach curl, while others have several kinds to meet the requirements of different seasons and conditions, as wheat rust. Some fungi complete their growth during warm weather, while some grow slowly all winter and have a fresh set of spores ready by spring, of which the black knot is an example.

If we consider fungi in relation to the application of fungicides, they may be conveniently classed as epiphytic, embracing such as grow on the surface of plants, like the pea mildew, and endophytic, such as grow within the plant, like peach curl or oat smut. Many of the endophytic kinds send branches of the mycelium to the surface on which spores are borne, but the rest of

* So called by De Bary, in *Vergleichende Morphologie und Biologie der Pilze*, 1884, p. 140.

the fungus is concealed within the tissues of the host. A writer recently commenting on the disease of the lily, and acknowledging his total ignorance of its nature, said: "But it makes little practical difference, as all these low forms of fungous life, whatever may be their names or character, are usually destroyed by sulphur," and so are birds caught by putting salt on their tails. My youthful experience in bird catching, however, soon taught me that there existed a prime difficulty in getting the salt in contact with the bird, and so he who tries sulphur on all fungi will soon learn that a like difficulty awaits him. As a rule sulphur is an effective fungicide for the epiphytic kinds, but it goes without saying, one would think, that it is useless for the endophytic ones. For when the fungus is entirely within, the utmost efficiency that could be expected from the external application of sulphur would be to prevent the production or germination of spores on the surface of the host, and in some cases to thus act as a check to the spread of the disease. And what is true of the application of sulphur is true of all other fungicides employed at the present time.

The following diseases are treated more or less fully in this report:

Diseases of the pear:

- Pear blight.
- Leaf blight and scab.
- Leaf brownness.
- Leaf yellowing.

Diseases of the apple:

- Apple blight.
- Leaf blight and scab.

Diseases of the quince:

- Quince blight.
- Leaf brownness.
- Leaf mildew.
- Quince rot.

Diseases of the peach:

- Yellows.
- Curl.
- Gumming or gummosis.

Diseases of the tomato:

- Rot in green tomatoes.
- Rot in ripe tomatoes.

Disease of oats:

- Smut.

Disease of clematis:

- Rotting of the roots.

Disease of Canada thistle:

- Brown rust.

DISEASES OF THE PEAR.

Pear Blight.

Pear blight is a disease so well known that no minute description is needed to indentify it. Its chief characteristic is the blackening of the branches and foliage, usually accompanied with a peculiar putrefactive odor. The disease may attack any part of the tree, except it be the roots, and either progress till the whole tree succumbs, or stop short at any point. It is also known both as *fire blight* and *twig blight*.

Many theories have been proposed to account for it, of which the one ascribing it to the direct influence of bacteria is so far in advance of the others that it alone need be considered in the present connection. It may be well to say at the outstart that the bacterial theory is not absolutely proven, but it has reached that stage of plausibility where it is able to account for the known facts, and is therefore of practical service. We will first present what previous researches have revealed, then state the results of our own labors, and finish with some general conclusions.

Bacteria were first noticed in connection with pear blight by Professor T. J. Burrill in 1877,* but no experiments were undertaken till 1880.† He then made an extended series of careful inoculations which resulted in showing that the disease could be easily communicated from one pear tree to another by introducing into healthy tissues a little of the exudation from a diseased part, and in the same manner could be communicated to the apple and quince. Experiments were also tried to determine how the disease is naturally propagated from tree to tree, tying diseased branches into healthy trees, and smearing the uninjured surface of stems and leaves with the exudation used in inoculations, but with purely negative results. Little else has been added to our knowledge of the disease up to the present season. The subject of bacteria as the cause of disease in plants is a very recent one. The best proven case other than pear blight is that of the yellow disease of hyacinths which has occasioned great losses to bulb growers in Holland during the past few years. The investigation of this has been undertaken by Dr. J. H. Wakker,‡ of Amsterdam, but up to the present time without materially extending our knowledge of such diseases in general. In brief this much had been done previous to the beginning of the year 1884 in direct experimentation upon pear blight and similar plant diseases.

In beginning work upon this subject my first object was to retrace the ground gone over by Professor Burrill. In carrying out this part of the work I was specially favored in having an abundance of healthy pear and other fruit trees belonging to a number of

*Trans. Illinois Hort. Soc., 1877, p. 114: same, 1878, p. 80.

† Proc. Amer. Assoc. Adv. Sci., XXIX, p. 583; Amer. Nat., XV, p. 527.

‡ Bot. Centralblatt, XIV, p. 315; Onderzoek der Ziekten van Hyacinthen, Haarlem, 1883.

varieties conveniently situated for observation, together with a nearly entire absence of spontaneous outbreak of the disease in the immediate vicinity; the only occurrence of blight on the Station farm not produced by inoculation being upon a few twigs on one of the quince trees. These were discovered July 26, and promptly removed. A branch or two blighted on a pear tree half a mile distant, and were removed July 11, but so far as known no other cases occurred nearer the Experimental orchard than a mile and a half. A total of one hundred and twenty one inoculations were made. In the first seventeen experiments, all made the same day, the inoculation was performed by removing a small amount of the sticky exudation from a freshly blighted pear branch and inserting it in the tissue to be infected by using the point of a pin. In all subsequent trials some of the diseased branch was sliced into enough water to barely cover, rinsed about for a few moments, and removed, which left the water slightly milky. The inoculation was made by puncturing the tissue of the plant with a pin and applying a drop of the infusion. The use of the exudation is troublesome, as it is often inconvenient to procure it in good condition and owing to its adhesiveness is inserted in the wound with difficulty. The infusion conveys the infection with equal certainty. These inoculations were performed late in the afternoon, and when convenient on a damp day, but no other precautions were taken to insure a perfect inoculation.

The accompanying tables give each experiment by number (experiments of all sorts being numbered consecutively as undertaken), the part of the tree which was inoculated, the source of the virus used in the inoculation, and the number of days intervening between the time of inoculation and the first external indication that the disease had taken hold of the healthy tissues.

A glance at these tables shows so plainly that the disease may be

PEAR.

No. of experiment.	Part treated.	Source of virus.	Days of incubation.
17	Stem.	Pear.	8
18	"	"	8
19	"	"	6
20	"	"	6
51a	"	"	9
51b	"	"	9
52a	"	"	.
52b	"	"	..
53a	"	"	10?
53b	"	"	..
83	"	Apple.	23
84	"	"	9
85	"	"	9

No of experiment.	Part treated.	Source of virus.	Days of incubation.
86	Stem.	Apple.	20
25	Leaf.	Pear.	..
26	"	"	..
27	"	"	..
28	"	"	6
84	"	Apple.	..
71	Fruit	Pear.	6
72	"	"	6
73	"	"	6
74	"	"	6
75	"	"	6
87	"	Apple.	7
118	"	Quince.	3
119	"	"	3
120	"	"	3

transferred from one tree to another by means of inoculation, as maintained by Professor Burrill, that I deem it unnecessary to state the facts more fully.

The place of the inoculation was early found to be a matter of moment. Good results were obtained with thrifty growing parts, but to get the best results it was not only necessary to use green or

APPLE.

No. of experiment.	Part. treated.	Source. of virus	Days of incubation.
29	Stem.	Pear.	8
30	"	"	8
61	"	"	11
62	"	"	11
63	"	"	8
64	"	"	9
65	"	"	11
114	"	Quince.	5
115	"	"	..
135	"	Pear.	5
136	"	"	5
137	"	"	5
138	"	"	15
139	"	"	5
31	Leaf.	"	20?
32	"	"	..
99	Fruit.	"	15
100	"	"	5
111	"	"	15
112	"	"	15
113	"	"	8

immature parts, but those which had not yet attained full size, i. e., those in which the tissues were still elongating. Thus in shoots of the present year's growth, but which had reached full length at the point chosen, the infection usually would succeed but only after a long period, while in yet older wood it invariably failed. In tender elongating shoots the arrest of growth at the point of inoculation often lead to a curvature, owing to extension of the opposite unaffected tissues, so that the part above was bent out of its course

QUINCE.

No. of experiment.	Part treated.	Source of virus.	Days of incubation.
33	Stem.	Pear.	16
130	"	"	21
131	"	"	21
132	"	"	21
133	"	"	21
134	"	"	9
66	"	"	9
67	Fruit.	"	8
68	"	"	7
69	"	"	7
70	"	"	7
123	"	Quince.	12
124	"	"	12

full forty-five degrees, or even sixty. This was especially marked in the apple shoots. In the case of leaves its failure to infect is directly traceable to the age of the leaf. And this is not surprising when we remember that the leaves on a blighted branch may remain green and apparently normal for two weeks or more after the death of the branch, as pointed out by Professor Burrill,* showing them to be poorly suited to the growth of the bacteria. The pear leaf given in the table (exper. 28), which showed disease after six days, had reached scarcely one-third full size.

This requirement of immature tissue is equally marked when in-

THORN.

No. of experiment.	Part treated.	Source of virus.	Days of incubation.
91	Stem.	Apple.	6
92	"	"	7
101	"	Pear.	6
102	"	"	6
103	"	"	7
104	"	"	10 ?
105	"	"	7
116	"	Quince.	..
117	"	"	..

*Proc. Am. Assoc. Adv. Sci., XXIX, p. 592.

oculation is made on the fruit, the most successful trials being with fruit about two-thirds grown, the earliest made, showing a development of the disease of astonishing virulence. Fruit of full size and on the point of ripening took the infection slowly, and in a much milder form.

Another element affecting the virulence of the disease was brought into notice while working on the fruit. This made prominent the fact that the more succulent the tissues the more strongly manifested became the disease. It was well shown in experiments 71 to 75 on green fruit of Bartlett pear. These were begun on July 24, and not again looked at until July 30, when they were found to have uniformly developed a wholly unexpected form of the malady. A circular spot three-fourths of an inch across had taken on the brown color of rotting fruit. At the center of this spot, and immediately

JUNE-BERRY.

No. of experiment.	Part treated	Source of virus.	Days of incubation.
56	Stem.	Pear.	6
57	"	"	..
58	"	"	..
59	"	"	..
60	"	"	..
89	"	Apple.	..
90	"	"	..
121	"	Quince.	5

surrounding the wound made by the inoculation, the tissues had sunken somewhat, while from the slightly enlarged wound there flowed an abundant yellowish pus that ran down the surface of the pear and dripped on the ground. It was an ulcer of quite as sickening appearance as if on animal flesh. The pears were all but one removed at once from the tree and placed under bell jars in the laboratory. The remaining one was left three days longer, and not showing any additional features of the disease was then removed. Upon cutting open one of the pears almost the whole interior was found to be diseased and brown. On August 4 two pears lying unmolested in the bell jars had become so thoroughly rotten with the disease that several new abscesses had broken out, from which as well as from the original wound there was a copious suppuration. The instances which follow are in marked contrast. On July 26 a Flemish Beauty pear was inoculated (exper. 87) which only produced a single large drop of exudation from the wound, much too thick to flow. Several Baldwin apples inoculated July 31 partly gave no exudation and partly (exper. 100 and 113) barely as much as the Flemish Beauty pear. A number of quince fruits were inoculated (exper. 66 to 70) at the same time as the Bartlett pears but gave no exudation at all. The different results are in the main explainable on the ground of the varying succulency of the different fruits. The va-

riety, the age of the fruit, and several other factors may have had some influence, but the season's work seems to show that these are subordinate. Three Bartlett pears inoculated August 2 (exper. 118 to 120) gave very slight exudation, and three pears of each of the following varieties, Bartlett, Howell, Flemish Beauty. Mt. Vernon, Seckle and Doyenne Bussac, inoculated August 9 (exper. 148 to 162, not tabulated), gave no exudation whatever. In these cases there appeared to be no doubt that the lack of exudation was due to a milder form of the disease induced by the approaching ripeness of the fruit, for in each case the pears became quite mellow before the experiments were closed. The last named experiments were undertaken to see if any difference could be traced in the action of the disease in the several varieties used, but owing to the lateness of the season, or rather ripeness of the fruit, no conclusions could be drawn. What is true of the fruit in regard to succulency, is apparently true of the other portions of the tree, but of necessity in a less marked degree. It may be that the supposed susceptibility of certain varieties is in part referable to their possessing softer tissues or lateness in maturing the recently formed parts. But it is a question requiring more data than is at hand and must be left for further study.

An other point made by Professor Burrill was that the blights of pear, apple and quince are identical, a conclusion that my own work fully sustains, for in all the experiments performed the result did not in any way appear to be influenced by the source of the virus. That made use of was from apple, pear and quince, mostly obtained from young nursery trees about a mile and a half away. As shown in the tables, it was used both upon the same kind of trees from which derived and interchangeably, and as I have said without appreciable difference in the results. The test was carried even a step further by using a virus from quince, which had received its infection from pear, and continuing the disease in the pear, apple, quince, etc. Several such permutations were made with no variation that could be traced to the changes.

If the disease would thrive upon the apple, pear and quince, it seemed worth while to test its action upon other plants. Eight inoculations were made upon June-berry (*Amelanchier Canadensis*) of which two were thoroughly successful. These two were on tender growing shoots with immature leaves; those that failed were in shoots of the present season's growth but full size and fairly ripened. I do not therefore doubt that the maturity of the shoots was quite sufficient to account for the failures. Nine experiments were tried upon thorns, two being upon the English hawthorn (*Crataegus Oxyacantha*), and the remainder upon the evergreen thorn (*Crataegus Pyracantha*). Of the two instances on hawthorn (exper. 91 and 92) one resulted in completely killing some inches of the shoot, while the other extended less than an inch along the stem but then stopped, and as it did not encircle the stem, the shoot was not killed. Of the instances

on evergreen thorn two (exper. 101 and 102) killed the shoot, three (exper. 103 to 105) more or less checked the growth, while two (exper. 116 and 117) showed no effect. The last two experiments were begun on August 2, and the others on July 31. The cause of the failures with the thorn both partial and complete is not quite plain. The shoots had not reached their full growth, and continued to elongate after the inoculation. The lateness of the season may have had something to do with it, but just what is impossible to say.

Seven inoculations were made in the twigs of oak-leaved mountain ash without results. The dates were July 24 and 29. Owing to the earliness with which the mountain ash matures, its wood was already solid and practically ripe, and the failure to secure infection ought not therefore to be a surprise. All experiments so far recorded were on members of the pear family, having a rather close relationship with each other.

A few trials were made outside the pear family; one on stem of black raspberry and three on green grapes giving no result, but those on peach proving very interesting. The latter did not, however, reproduce the blight, but gave rise to what appeared to be genuine gummosis, the further discussion of which will be given under that head.

The variability in the time required for the disease to pass through the state of incubation and become outwardly visible was evidently due to a number of influences, partly susceptible of statement and partly very obscure. The most obvious were the maturity and succulency of the tissues already mentioned. The influence of the vigor of the tree aside from the succulency of the part inoculated, the lateness of the season as a separate factor from the maturity of the part experimented with, the weather, particularly the temperature and moisture of the air, all have conspired to vary the progress of the disease, but no data could be secured. A mechanical difficulty presented itself in the case of the apple and quince, for the surface of the stems of each, and of the quince fruit, are closely woolly or pubescent, and changes in the color of the surface beneath cannot be traced readily. In the apple the pubescence about the wound often turned brick red, extending sometimes as far along the stem as the tissues became diseased, and occasionally also showing inside. I could not make out what the color, which was usually evanescent, was due to, or if it could be produced by other means. The outward indication of the disease was not always commensurate with the progress within, for in several instances in the fruit the disease passed rapidly to the core but spread laterally with much slowness, while sometimes in the stems it would pass some inches along the inner tissues before it showed at the surface. It is therefore evident that the number of days given in the tables as the time of incubation does not represent the same stage of the disease in every case. We may, however, say that under favorable circumstances the disease will appear in about a week after inoculation. I have now passed over the chief features of the experiments establishing the infectious

nature of the disease, and have shown that it may be easily conveyed from tree to tree of apple, pear and quince as already proven by Professor Burrill, and even to the English hawthorn, evergreen thorn and June-berry, and by inference to any pomaceous plant; that on the contrary it is not likely to thrive upon plants outside this group. I have shown that inoculations may be made not only in the stem as practiced by Professor Burrill, but also in the leaf and fruit; that immature tissues take the disease most readily, and specially those of a succulent nature.

I shall now pass to the reasons for ascribing the disease to the agency of bacteria. In the first place it is well to bear in mind that bacteria are plants living upon organic matter, and the smallest of all living beings; they possess the power of independent motion like animalcules, reproduce principally by division, i. e., each divides into two, each of these into two, and so on, the parts formed at each division growing to be as large as the parent; that under some circumstances, however, they reproduce by spores.

If a thin slice of diseased pear wood, especially when taken at an active stage of the disease, be placed in a drop of water, a white cloud will be seen to emanate from it and spread through the water. If this be looked at with a magnifying power of about four hundred diameters, the whiteness is resolved into minute rounded bodies somewhat longer than broad, and apparently colorless. These are bacteria, and occur in numbers that are absolutely inconceivable. They have been found to be a constant accompaniment of the disease, being the crucial test of its genuineness. But it may be urged that they are only the bacteria of ordinary putrefaction which invade the tissues as fast as they become weakened by disease. That the disease is inseparable from the bacteria, however, seems almost certain from the fact that they are to be found in advance of any visible change in the tissues. That they induce an incipient putrefaction is evident from the changed color of the tissues, the strong and peculiar odor by which an experienced person can detect the disease before seeing it, and by the remarkable readiness with which a diseased branch will mould when placed in damp air. They are, however, conspicuously smaller than the common putrefactive bacteria (*Bacterium Termo*); neither can the latter be substituted for them, as was demonstrated by inoculating various plants, including pear and peach, with an infusion of the bacteria from rotting tomato in the same manner as for pear blight, and in every case without results. But it may still be urged that in inoculation it is not the bacteria which convey the disease but some poisonous principle in the mucous surrounding them or in the dead juices of the plant, which kills the tissues and paves the way for the growth of the bacteria. Here it must be confessed is the weak point in the bacterial theory. It has been shown that the disease is infectious and always accompanied by a specific bacterium, but it has not been shown that the bacteria when completely isolated from the fluids about them will convey the disease, or that, on the other hand, the fluids freed from

the bacteria will not convey the disease. Until this demonstration is furnished, and it is one that is entirely feasible, the bacterial theory of pear blight is not thoroughly proven. But nevertheless it is quite evident that, as the theory is in accord with all the known facts, part of which are otherwise unexplainable, it answers for the present every practical requirement.

Taking it for granted now that the disease is due to bacteria, I shall pass to the discussion of its natural mode of propagation from tree to tree. The experiments performed by Professor Burrill consisted in bringing diseased branches in contact with healthy ones, and in smearing the surface of twigs and leaves with virus; they gave no results. I repeated the latter upon green fruit, without results. It was noticeable in the case of the ulcerous pears that the pus, as it ran over the surface of the yet unaffected part, did not discolor or change the tissues in the least. In trying the experiment upon leaves I was able, in one instance, to communicate the disease to a vigorous growing shoot by smearing virus upon a very young leaf at the apex. This was done in the laboratory by keeping the cut end of the shoot in water. In another experiment a watery infusion of the blight, such as used for inoculation, was permitted to drip for some hours at about the rate of four drops per minute upon a tender shoot kept fresh in water, care being taken that none of the infusion got into the water in which the shoot was placed. Both apple and pear shoots were tried, and one of the former appeared to take the disease. But none of these experiments were satisfactorily performed, and I only mention them as affording serviceable hints. In another trial a young pear tree about a foot and a half high, which had become well established in a flower pot, was watered exclusively from August 7 to 31 with a copious supply of water made milky with infusion of pear blight; no results followed.

From such scanty data as these no positive conclusions can be drawn, but the following conjectures seem plausible: The bacteria escape from the tissues in the slimy drops that ooze out from the diseased parts, especially in damp weather. They are washed off and freed from the viscid part by rains, and upon becoming dry are taken up by the winds. Being now suspended in the air, a damp day, dewy night, or light rain would bring them in contact with the delicate surface tissues of expanding buds, or the exposed internal tissues of fresh cracks or wounds, in the most favorable way to introduce the contagion. This is quite in accordance with the fact that the disease usually starts at the ends of the branches, but also appears sometimes on the larger limbs and even the trunks. It also explains the fact that the rankest growers are most subject to attack, these exposing more tender surfaces, and upon the disease obtaining a foothold, furnishing more succulent tissues. The disease is even said by some to be a product of high cultivation; on the other hand, a nurseryman told me a few days since that the land we were surveying was so poor that pears would not blight upon it, which I could believe was quite possible, for the trees would grow so slowly that no surface of suf-

ficient delicacy would be exposed to permit infection. Observation has shown that there is some connection between the attacks of blight and the direction of the wind, for it has been noticed that the trees on the windward side of an orchard are sometimes first and most severely blighted, and again, that a tall hedge has checked the march of the disease; all of which is quite reconcilable with the view proposed.

Another possible mode of contagion is by the punctures of insects. Having come in contact with the fresh exudation of the blight, they would certainly carry some away, to be distributed at the places where they alight. But I am not inclined to consider this a very frequent means of contagion.

It is apparent that the disease does not find access to the plant by way of the roots, both from my experiment and from its local nature.*

What now shall be the nature of the controlling treatment? None can be suggested that promises so well as the old one of the knife—vigilantly destroying every trace of the disease. The most satisfactory course would be to remove each limb as soon as the bark becomes discolored, but this is impracticable on account of the inconspicuousness of the change. The blackened leaves will usually be the first indication of its presence; the disease will then have been in progress two or three weeks or more. The limb is to be removed some inches below the point where the bark is discolored, the distance being greater where the disease is of longer standing. Unless the knife has been carelessly passed through a diseased part, there is no need of using disinfectants, and in that case it is easier to take another knife than to cleanse the contaminated one. By regularly inspecting the orchard once a fortnight or so, the disease, except in very severe attacks, may be kept entirely in check with only now and then the loss of a tree where it has found access to the trunk. Whether any harm can arise from the limbs being left upon the ground cannot be definitely stated, but there is probability of it, and it is certainly a surer course to annihilate all life in them by burning.

It may be well to say a few words about proposed remedies that are not likely to be of value. The most promising of these is checking the growth of the tree by mulching, withholding of fertilizers and cultivation, or putting the land into grass. That this will succeed in giving a certain immunity cannot be questioned, but whether the gain is greater than the loss is to be doubted. The method might, however, be serviceable during periods of unusual severity, lasting generally from three to five years. The application to the soil of sulphur, salt, potash, lime, fertilizers of all sorts, drugs, poisons, or any thing whatever, is not likely to afford any relief or im-

* It is doubtless a slip of the pen when Penhallow says that pear blight "involves the entire system," as in the case of peach yellows.—Popular Science Monthly, XXV, p. 388.

munity. Preventing the access of germs from the air by spraying the trees with some antiseptic is theoretically possible, but the difficulties in the way of practical application are so great as to give no hopes of success.

LEAF BLIGHT AND SCAB.

Fusicladium pyrinum, Fckl.

Leaf blight appears as dark brown or blackish spots on the leaves, leaf stalks and one year old branches. It is most noticeable on the under surface of the leaves forming indefinite patches, at first barely perceptible in the slightly changed color of the surface, but finally becoming more extended and curling the leaf, especially when on the midrib, by stopping its growth.

The amount of injury done to the pear tree is often very considerable, as it is a fungus and draws heavily upon the tree's food supply to maintain its own growth, and also interferes with the elaboration of new material by obstructing the light and weakening the assimilative power. The fungus inhabits the part of the leaf just beneath the surface with a dense growth of mycelium, from which a great number of vertical branches are sent up into the air bearing the spores. This manner of growth gives the surface a minutely velvety appearance to the unaided eye.

Sometimes the fungus is seated on thickened scab-like spots on the under side of the leaf, varying from mere points to an eighth of an inch across, and occasionally coalescing into larger areas. Small holes are to be seen in some of the spots as if an insect had escaped. These raised spots are in fact caused by a minute mite, *phytoptus piri*, and the spongy growth of the leaf which it induces seems specially favorable to the growth of the fungus.

The leaf blight thrives with equal vigor upon the fruit where it causes the disfigurement and injury known as scab or rust. Its effect in checking growth is seen better here than on the leaves, owing to the much more rapid development of the fruit, and gives the one sided and spotted appearance which detracts so largely from the marketable value.

Our knowledge of the life history of this fungus is not very complete. The exact mode of distribution, and manner of securing a foothold on the new growth of the season are almost unknown, but yet are important items in devising a method for its control. Prillieux,* who studied it in France, thought that it might be introduced upon young trees in the process of grafting, and could be perpetuated on a tree once attacked by being carried over the winter on the young branches. But it is quite as likely that the distribution is effected by spores blown through the air. It becomes most troublesome in rainy seasons, and for the same reason its development is accelerated by damp warm weather, or a damp location.

* Comptes Rendus, 1877, p. 910.

No experiments in combating the disease were tried at the Station. Of the remedies which have been proposed, the following appear meritorious. They are based upon the supposition that the fungus coming so near to being entirely on the surface may possibly be reached by outside application, at least in some of its stages. Whether this hope will prove well founded can only be told by trial. Professor Burrill recommends kerosene emulsion made with soap or milk* as used for insects. Professor Saunders suggests three fungicides, either (1) hyposulphite of soda in proportion of one pound to ten gallons of water, or (2) sulphide of lime made by boiling two pounds of sulphur and one pound of quick-lime in two gallons of water with frequent stirring till of a reddish yellow color, then allowed to settle and the clear liquid poured off, or (3) sulphur in proportion of one pound to ten or fifteen gallons of water, kept suspended in the water by constant stirring.† These are to be applied with syringe or force-pump. The best time of application must be determined by trial, but just before the leaves appear and during the early stages of the fruit would seem to be vital periods. It is also generally conceded that good drainage, open pruning, and judicious selection of varieties will do much to prevent its appearance. I judge from my own observations that whatever promotes the vigor of the tree will in so far act as a check to the development of the fungus. Its affinities are with those sorts that live upon dead or decaying plants, and we may therefore expect that a weakened constitution will be more congenial to it than a vigorous one. We may also infer this from the fact that it is the enfeebled tree made so by age, injury or lack of cultivation that suffers most.

LEAF BROWNNESS.

Morthiera Mespili, Fckl.

This fungus causes the tissues of the leaf to turn dark brown or blackish in small rounded spots which show on both sides the leaf. On the surface of these spots and mostly on the upper surface of the leaf, are a few minute black specks which the microscope shows to contain curiously grouped colorless spores, each with a lash as long as itself. (See fig. 1.)

The oldest leaves are attacked first, and the disease progresses towards the end of the branches. The leaves are finally killed and drop from the trees, but the fungus is so inconspicuous that its presence might be readily overlooked, and the fall of the leaves ascribed to a wrong cause.

It has been studied by Sorauer‡ whose vernacular name for the disease (Blattbräune), I have adopted, for want of any English name, although it does not seem particularly appropriate. He placed some

*Trans. Mississippi Valley Hort. Soc., 1883, I, p. 202.

†Canadian Horticulturist, VII, p. 127.

‡Quoted by Frank, in Krankheiten der Pflanzen, p. 590.

spores on a healthy leaf, saw them germinate and bore their way into the leaf, and in two weeks the characteristic brown spots appeared, with the black specks in due course of time. He found upon the fallen leaves in winter what he took to be the same fungus producing another set of spores (ascospores), which became ripe in April and May. Such fungi are able to keep up a slow growth all winter, when higher vegetation is at a standstill. These winter spores probably propagate the disease on the new leaves of spring. He also found that the fungus is in some instances able to winter over on the bud scales without entering a second stage. The disease affects young trees most, and especially those of weakly growth. No remedy is yet suggested. The same fungus apparently is very common on wild and cultivated thorns.

LEAF YELLOWING.

This disease was observed in a large pear orchard not far from the station. By midsummer the leaves began to turn yellow and more or less flame colored. Microscopic examination of the tissues of the branches showed them very full of starch, but gave no indication of the cause of the difficulty. No fungi were present of any sort, externally or internally. The trees were evidently languishing, and at last dropped their leaves long before the usual time. The true nature of the malady might have remained undiscovered had it not been for an accidental circumstance. A large pear tree within view of the office window showed one of its large lower limbs to be afflicted in the manner described, while the remainder of the tree kept its healthy green color. The microscopic examination of the tissues, the change of color in the leaves, and their early fall, tallied accurately with the cases already cited. The clue to the matter was found when it was discovered that the limb had been girdled some time previously, apparently not within a year, and that this was the line of separation between the healthy and diseased parts. The solution of the difficulty was plain; the leaf yellowing was due to defective nutrition. The orchard where the first named instances were observed had once been one of the largest in the country, but having been seriously depleted by blight, had been put into grass and much neglected. Fertilizers and cultivation would doubtless restore the trees to normal health. Professor Penhallow* recommends phosphates for invigorating pears, and sulphate of potash as a special fertilizer. It is plain that individual cases arising from injuries will require special treatment.

DISEASES OF THE APPLE.

Apple Blight.

It has been shown under the head of pear blight that these two

* Before the Mass. Board of Agriculture, Dec. 1884. See New England Farmer for Dec. 13.

diseases are identical in origin. There are slight differences in the action owing to differences in the nature of the trees, but I have been unable to make sufficiently extended observations to state them exactly. The disease seemed to progress about as rapidly in the apple as in the pear, but owing to the hairiness of the former, as already stated, accurate comparisons were not practicable. A different method of comparison was also tried. On August 7 a drop of virus from pear was placed in the center of a slice of Baldwin apple and of Bartlett pear, and the slices kept moist under bell jars. The extension of the disease spots over the surface did not differ much in rapidity, but was more conspicuous on the pear. In the latter it rapidly reduced the tissues to a semi-fluid condition, while in the apple it broke them down very slowly. But we cannot say that the results might not have been quite different or even reversed by taking different varieties of the two fruits, or trying the experiment at an earlier date. A more obvious difference is shown in the leaves and wood of the apple not turning blackish when killed by the blight as do those of the pear, but to a dark brown, a difference apparently due to the chemical constitution of the two.

APPLE SCAB AND LEAF BLIGHT.

Fusicladium dendriticum, Fckl.

This disease is very similar to that on the pear, and it is quite possible that the difference in the growth of the fungus, which entitles it to a different specific name, is due to the influence of the plants on which it lives. It is usually more abundant on the upper surface of the leaf than on the lower, which is so covered with close pubescence as to obscure its early stages.

The rusty or scabby spots on ripe apples continue to grow throughout the winter, or as long as the apple is sound, but new spots do not appear to arise; so no harm comes from placing perfect and spotted apples together in the same bin. According to Mr. Hatch of Wisconsin from five per cent of Dutchess to as much as ninety-nine per cent of Fameuse and Walbridge scab injuriously in bad years.* In some years there is almost a total loss of the crop from this cause, while in almost every year an appreciable part is rendered unmarketable.

The growth and reproduction of the fungus has been studied by Sorauer,† but without learning how it obtains entrance to the tissues. A very complete statement of the habit of the fungus, and of the injury done to the several varieties of apples, has recently been published by Trelease.‡ The same remedies suggested for pear scab are applicable here.

* First Annual Report Wis. Agric. Exper. Station, p. 52.

† Quoted by Frank, in *Krankheiten der Pflanzen*, p. 587.

‡ First Annual Report Wis. Agric. Exper. Station for 1883, pp. 45-56.

DISEASES OF THE QUINCE.

Quince Blight.

This has been treated under the subject of pear blight. It has all the characteristics of apple blight, and, like that, does not cause the dead parts to turn black, but only brown. I have never, however, seen the reddening of the hairs and tissues noticed in the apple. Treatment is the same as for pear blight.

LEAF BROWNNESS.

Morthiera Mespili, Fckl., var., *Cydonia C. & E.*

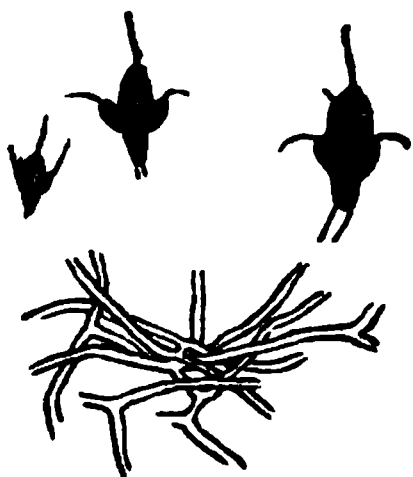


Fig. 1. — Mycelium and spores of *Morthiera Mespili*, Fckl., var., *Cydonia C. & E.*, or quince leaf brownness. Magnified 250 diameters. Original.

This disease of the leaves is very similar, if not identical, with that on pears. The spots made by the fungus are, however, more conspicuous, being of a light-brown color, and showing equally well on both sides of the leaf. They are most often about an eighth of an inch across, nearly round, but coalescing in places into extended brown patches. The central black dot is very noticeable upon close scrutiny. This is a common disease, but does not often prove very harmful. It affects crowded nursery stock particularly, but may occur on trees of any age and location. No remedy has yet been suggested.

LEAF MILDEW.

Podosphaera tridactyla, (Wall.)

This, like most of the parasitic white mildews grows entirely upon the surface of the supporting plant. It consists of a cobwebby film of interlacing filaments, spreading over both surfaces of the leaf, but best developed on the upper side. To the naked eye it appears like a whitening or mouldiness of the surface; almost every one has noticed the very similar affliction in lilacs. It usually appears in June, soon producing an abundance of colorless spores to spread the fungus rapidly to other leaves and other trees. In the latter part of July the minute dot-like fruits begin to appear, and continue to do so until the leaves fall. These look to the naked eye like mere particles of dust, but their regularity in size, perfect roundness, and not being dislodged by blowing or slight friction will usually distinguish them. The resting spores, which are able to withstand the rigors of winter and reproduce the mildew in the spring, are contained in these fruit dots.

The disease was noticed on the lower limbs of quince trees, growing against a wall where they were somewhat shaded. The fruit-dots were produced in the greatest abundance. The fungus is one

which, other things being equal, thrives best upon a vigorous plant, yet does not disdain a weakly one; but its draft upon the plant naturally shows most in the latter. The same fungus, although also doing damage to seedling apples is oftenest met with on cherries, even curling the leaves and causing their premature fall.

As the fungus is an entirely superficial one, it ought to be possible to control it. Sulphur is the principal remedy for this class of ailments, but I am not aware that it has been tried in this case, and its efficacy with each fungus can only be told by testing. It is to be applied by wetting the foliage, preferably with water containing considerable soap, and then dusting on the sulphur.

QUINCE ROT.

Sphaeropsis Cydoniae C. & E.

When the quinces were gathered at the Station in October quite a considerable part of them had begun to rot, many having become worthless. The rotting usually began at a few centers only on each fruit and spread regularly in circles until the whole fruit had decayed. The spots retained considerable firmness, but eventually became more or less flattened. As they enlarged the centers took on a blackish hue, and by close examination could be seen to be covered with black points. These points contained innumerable brown spores, capable of spreading the disease. This was tested (exper. 218) by inserting a minute piece from the surface of the diseased fruit containing the spores beneath the skin of a sound quince under a bell jar. The spores germinated, and the rotting progressed slowly, when, on the twenty-second day, the spot had reached an inch and a half in diameter, and the fruiting points had begun to appear. The same experiment was tried upon a pear (exper. 222), but although the spores germinated, the mycelium did not thrive and penetrate the tissues. Common rot (*Penicillium*) soon set in, and terminated the experiment at the end of the ninth day. No preventive is known for this malady.

DISEASES OF THE PEACH.

Peach Yellows.

No cases of yellows occur in any peach orchards in the immediate vicinity of the Station. On July 11 a visit was made to several extensive orchards near King's Ferry on Cayuga lake, about twenty miles distant, where through the kindness of Mr. J. C. Atwater I had the opportunity of inspecting great numbers of sick trees in all stages of decline. Whether any of these trees were suffering from the genuine yellows (if it be a specific disease at all) I was unable to satisfy myself. That many of them were slowly dying could not be questioned. Some showed premature fruit, a few had small, wiry and somewhat fascicled branches, and the majority had more or less

yellow, often very depauperate foliage, tinged with red; but these characteristics were not often concentrated upon the same tree. The microscopic examination proved not at all more definite. Some of these trees stood in cultivated land, but many of them were much neglected; they were of all ages. At one place a small hillside orchard had become entirely worthless, and only awaited a convenient time to be uprooted. In the mean time it was necessary to plow and fertilize a portion of it to be cultivated as a garden, and the trees of this part had surprised the owner by taking on a most vigorous and healthy look, with ample deep green foliage.

The peach trees of the Station of various ages stand in ground having the high cultivation of a garden, and although some of them are seriously afflicted with the curl and gummosis, they have shown no tendency toward yellow or undersized foliage. A garden orchard across the way, which does not receive so high cultivation, shows a corresponding decline in the healthy look of its foliage.

Judging from these observations and other similar ones, it seems evident that cultivation and fertilization of the soil are of more than usual importance in maintaining the health and fruitfulness of peach trees. I do not, therefore, doubt that in a great many instances the application of the special fertilizers so ably advocated by Professor Penhallow* would produce the desired effect. But so long as I am unable to decide to my own satisfaction upon the true nature of the yellows as a specific disease, it is obvious that the last remark cannot be construed into an advocacy of a remedy for that particular ailment.

In October a few peach trees were found about seven miles from the Station which showed every external indication of being in the last stages of the yellows. The microscopic examination confirmed this belief, showing that the cells were gorged with starch, and had the other indications described by Professor Penhallow.† Careful examination was now made for bacteria. It was at once apparent that if present at all they did not occur in the obvious and abundant manner seen in pear blight. Bacteria were occasionally found, and in one or two instances seemed to be grouped at one spot, but there was no absolute proof that they came from the interior of the tissues. Here the matter was allowed to rest. I am desirous of making a study of the disease the coming summer in localities where one can hope to find it in the fullest development.

PEACH CURL.

Exoascus deformans, Tul.

The curl has been very prevalent in this section of country. In the Station orchard it occurred upon some of the largest trees in so severe a form that they were all but killed. This was not, however,

* Consisting of 25 pounds kieserite, 125 pounds muriate of potash, and 450 pounds dissolved bone-black per acre. — *Houghton Farm*, ser. III, No. 2, p. 41.

† L. c., p. 81, pl. II; Trans. Mass. Hort. Soc., 1882, p. 127.

the first season of its appearance, for it is doubtful if it could ever become so harmful without accumulating strength by the growth of previous years.

The disease is readily recognized. By the latter part of May the leaves of an affected tree show very considerable contortion or crumpling, which continues to increase until the leaves have quite lost their normal appearance and grown into baggy folds and wrinkles, and at the same time become somewhat thickened. The whole leaf is not always affected; often a greatly-distorted leaf will have — it may be the apex — quite unaffected and normal. In about a month the surface of the leaf takes on a whitishness or bloom, especially upon the under side, and the leaves soon drop from the tree. In severe attacks the tree is almost or quite defoliated, the branches becoming about as bare as in early spring. More usually, however, new leaves are developed as fast as the diseased ones fall, so that while the ground is strewn with cast-off leaves the tree continues in full foliage. In either case, by the latter part of July the trees will be well provided with a second crop of healthy leaves.

The parasitic fungus which causes the disease grows exclusively inside the tissues of the tree. Although the mycelium is abundant it is difficult to detect on account of its delicacy and transparency. It was first seen in the leaf by Prillieux* in 1872, and Frank† has since detected it extending from the leaves through the veins and leaf-stalks into the bast bundles of the smaller branches. It insinuates itself between the cuticle and cells of the lower surface of the leaf, and there produces in June its numerous spores in minute sacs, each containing from six to eight. It is this fruiting of the fungus that gives the whitish bloom to the leaf just before it falls.

Nothing whatever is known of the way in which the spores transmit the disease, and it is difficult to frame plausible conjectures. The mycelium is, however, perennial, and lives from year to year in the younger branches, running out through the leaf-stalks and occupying the new leaves each season. One may easily convince himself of the probability of this by carefully watching a tree known to be infested, for he will be able to detect more or less evident traces of the disease from the earliest appearance of the leaves in spring to their fall in autumn; and having become familiar with these signs will be able to tell it in trees whose condition is not previously known to him.

The curl pays no regard to the condition of a tree, but may be found in the thriftiest, as well as in the weakest. Its life, however, is so thoroughly bound up with the life of its host that whatever influences the health of the tree, influences the health of the fungus, although not always to just the same degree. The harmfulness arises from two sources, first the necessity of the tree providing not only for its own nourishment but also for that of a voracious para-

* Bull. Soc. Botanique de France, 1872, p. 227.

† Krankheiten der Pflanzen, p. 526.

site, and secondly the loss of a whole crop of leaves at the very height of the growing season. A tree must have a vigorous constitution and be well cultivated and fertilized, indeed, to bear a crop of peaches under such a strain. A few large trees on the station grounds were so thoroughly filled with the fungus, and also previously weakened, that they produced a few tufts of leaves only till the fruiting period of the fungus had passed and it became comparatively inactive, when a normal amount of healthy foliage at last appeared. It was an instance where the growth of the fungus had so far outstripped the ability of the tree to supply the required nourishment that host and parasite were alike suffering. It is a common error to ascribe the attacks of fungous diseases to the influence of the weather, not considering that each fungus has its appointed season of development the same as a higher plant. In fact there is no more reason to suppose that it is wholly a matter of temperature and moisture that causes the curl to ripen its spores and complete its yearly growth before the heats of midsummer arrive, than that the same cause regulates the appearance of the peach blossoms. It is rather the hereditary habit which even the weather is rarely able to alter.

As it is not known how the disease gains access to the tree, of course no preventive measures can be intelligently prescribed. When a tree is once infested, however, the disease can be kept in check and possibly eradicated, by annually pruning away the ends of the branches in spring, thus destroying most of the mycelium that has lived through the winter. It is also recommended by Frank,* and several American writers, to destroy the diseased leaves; a troublesome operation, the utility of which cannot at present be fully demonstrated. Winter† recommends the protection of the trees from rain during the unfolding of the leaves, which may be practicable in Germany but is not in this country. De Jubainville and Vesquet‡ add to these the cultivation of the soil and a liberal supply of ashes or other fertilizers containing potash, which is certainly a requisite for complete success, if the trees are to remain in full vigor.

GUMMING OR GUMMOSIS.

Gumming or gummosis, the terms are synonymous, are the names applied to the production of the brown or amber colored gum that exudes from wounds on the body, limbs and even fruit of the peach, as well as other members of the same family, such as the plum, cherry and flowering almond. The phenomenon has excited much attention and the literature is extended, but the subject is yet by no means fully understood. Other duties having prevented my undertaking an extended series of experiments in this direction, I shall here only state as much of the subject as will convey some idea of the bearing of the few results obtained.

* *Krankheiten der Pflanzen*, p. 526.

† *Krankheiten der Kultur-Gewächse*, p. 47.

‡ *Maladies des Plantes Cultivées*, p. 300.

Most recent, as well as earlier writers, consider the exudation of gum in stone-fruited trees as pathologic, arising from some abnormal process or influence in the plant. The exact method by which the gum is produced is now through the investigations of Wigand, Frank and Prillieux very well known. It is found to proceed from a deorganization of the walls and contents of the cells, beginning in the wood and involving the bast and bark, and in severe cases the cambium also, the starch and other contents of the cells being at the same time included in the general change. The physiological significance of this process has recently been studied at the agricultural Hochschule at Berlin, under Frank's direction,* and the conclusion reached is that the production of gum where a wound has occurred is quite universal in woody plants, and serves as a protection to the exposed surface during the process of healing. It is, therefore, the excessive production of it that is harmful. This narrows down the inquiry very materially, for we have now only to investigate the cause of this increased activity which has changed a normal into an abnormal process, often causing an enormous waste of material that would have otherwise gone to the production of healthy tissues. Frank† is of the opinion that it is a symptom of the weakened vitality of the tree arising from some additional cause, and that, therefore, in order to prevent or cure the malady it is necessary to first restore the tree to health, when the gumflux can be easily checked.

A year ago Dr. Beyerinck of the agricultural school at Wageningen, Holland, conceived the idea that the production of gum might be caused by bacteria. By experimenting he found that the disease could be started in any of the plum family by inserting a little of the gum into a fresh incision, but that if the gum be first thoroughly heated no change takes place. This pointed directly to some living contagium, and in searching for it he finally fixed upon one of the higher fungi, instead of bacteria, whose mycelium and spores appeared to always be present.‡ The fungus was described as a new species of *Coryneum* (*C. Beyerinckii*) by Oudemans.§ The occurrence of mycelium in the gum is no new discovery, as spores are very easily caught in so viscid a substance, and many find it a favorable soil in which to grow. As long ago as 1855 Berkeley¶ called attention to the abundance of mycelium, especially in some cherry gum from South Carolina; but it was not considered as in any way related to the production of the gum.

The following experiments were tried at the station: June 17, small pieces of peach gum not exceeding the size of a pea were in-

* Cf. *Botanisches Centralblatt*, XX, p. 194.

† *Krankheiten der Pflanzen*, p. 93.

‡ Cf. *Gardeners' Chronicle*, XXI, p. 238; I have not seen the author's original paper, *Onderzoekingen over de Gomziekte bij Planten*.

§ *Hedwigia*, 1883, p. 113; Plowright, in *Gardeners' Chronicle*, XXI, p. 410.

¶ *Gardeners' Chronicle*, 1855, p. 205.

serted under the bark of one to three year old branches of thrifty peach trees. In three weeks all but one had apparently become established and new gum added. At the same time some gum from the same source was similarly planted under the bark of cherry and plum trees; of four plantings, all grew. The microscope showed the presence of abundant mycelium and spores, but whether of the species found by Beyerinck was not definitely determined.

In examining flowering almond bushes in June, many branches were found to have their terminal portion quite dead, and with an exudation of gum at the point between the dead and the living parts. In many cases this was also accompanied by a growth of the fruit rot fungus (*Oidium fructigenum*), it forming minute white tufts of spores over the whole surface of the branch from one to six inches above the gum. Whether the initiative was due to the puncture of an insect, occasioning the flow of gum, and this offering a favorable medium for the introduction of the rot fungus, all having a share in the final killing of the branch, or whether the several agents appeared in a different order, it is not our present purpose to inquire. The association of the rot fungus with the gumming was suggestive, and experiments were instituted to see if any actual relationship existed. Spores of the fungus were inserted in a slight incision of the stem of a vigorous young shoot of cherry, of peach and of flowering almond, kept fresh under a bell jar. Other shoots of the same sort were infected in the same way with spores of the same fungus taken, however, from rotting cherry fruits. All the spores germinated readily, and all but one of the cherry shoots showed the beginning of rot in the stem in twenty-four hours. Considerable of the stem and part of the leaves of the peach and of the flowering almond shoots were rotten in nine days. The remaining cherry shoot rotted about a third of an inch each way from the wound in the same time, and besides, what is the interesting point in this connection, two small drops of gum had exuded from the wound, which had all the characteristics of the usual cherry gum. Two days later the larger drop was removed and examined under the microscope and found to be permeated with the mycelium of the rot. As an isolated case, it is very difficult to say whether the fungus had any direct influence or not in producing the gum.

Another set of experiments, primarily undertaken for a different purpose, have a direct bearing here. On July 16, a number of inoculations were made on the vigorous growing branches of a peach tree, using the viscid exudation from the pear blight, but all of these except one (exper. 22) were destroyed by accident. This one did not reproduce a blight, but, most unexpectedly, in ten days gave a drop of clear amber gum that differed in no perceptible way from that produced by ordinary gummosis. The next trials were on July 24, when five inoculations were made, using an infusion of pear blight instead of the exudation and with uniformly the same results. One of these was carefully examined in section and bacteria were found abundant in a layer lining the wound, but not extending out

into the body of the drop of gum. It having been suggested that the gum might have appeared had no virus been applied, another set of inoculations was tried (exper. 144 to 147) in which two punctures about four inches apart were made on each shoot, one of which was wet with a drop of pear blight infusion and the other not. To detect any possible influence of the upward movement of the sap, in two cases the wound nearest the end of the branch was infected, in the other two cases the wound farthest from the end of the branch. The results were uniform; the infected wounds gave a drop of gum, and the others did not. Three of these branches were exhibited before the Botanical Club of the American Association for the Advancement of Science at its meeting in Philadelphia, with a statement of the case.

PEACH.			
No. of experiment.	Part treated.	Source of virus.	Days of incubation.
22	Stem.	Pear.	10
54a	"	"	6
54b	"	"	6
55a	"	"	6
55b	"	"	6
55c	"	"	6
144	"	"	5
145	"	"	5
146	"	"	5
147	"	"	5

Having now presented the various sides of the matter, I think we may safely conclude, taking all the facts into consideration, that the abnormally large production of gum in the peach and kindred trees is due to the inciting influence of a fungus, possibly bacteria, but more probably a filamentous fungus, and that it is not necessarily restricted to a single species.

The flow of gum is often a serious drain upon the vigor of the tree, and it becomes an important question what shall be done to stop it. Frank and Prillieux recommend cutting away entirely such small branches as are affected, and in larger branches cutting out the spots producing the gum. This is not always practicable, however, as for example in the following case. In looking over an orchard not far from the Station, trees were noticed which from one point of view were completely covered from the ground to the ends of the limbs with masses of gum averaging the size of a hazel nut, but on stepping to the opposite side of the tree the bark appeared normal and no gum visible. Upon inquiry it was learned that an exceptionally violent hail storm had passed over that part of the orchard early in the season, and that it came so that hailstones struck on the side of the trees now covered with gum. It was plain that the gum had started wherever the bark was injured by the hail. The knife could certainly not be used to advantage in this case. A trial of

corrosive sublimate was made at the Station, by cleaning the gum from the wounds and then applying a saturated alcoholic solution. In another experiment a slice of about a square inch of bark was turned back and well washed with the solution, a piece of gum as large as a pea was now inserted, the wound again drenched with the solution, and the bark tied down. A control experiment on the same limb was in every way the same except the corrosive sublimate was not used. Both grew vigorously, and the corrosive sublimate in this, as well as in the preceding instances, apparently exerted no more influence than so much water might have done. Several trials were made to burn out the diseased parts with red hot soldering irons, but while some of the spots showed no gum for several days, all finally began to flow again. Whether by a more thorough trial or even by one or two repetitions, the flow could have been eventually stopped, and the wound caused to heal, cannot be told, but the process seems to promise the best of any yet proposed.

DISEASES OF THE TOMATO.

Rot in Green Tomatoes.

The principal malady that came under our observation was one, or it may be a complication of several, causing great loss by the premature decay of the fruit. The rot usually began at the apex or blossom end of the fruit, and extended quite regularly on all sides toward the opposite end. It appeared as an even brown rot, without much changing the form or solidity of the fruit, and occurred at all stages of growth from small to full size. The microscope showed an abundance of mycelium in the interior of the fruit, accompanied by a profusion of bacteria. No spores were observed, and of course the identity of the mycelium could not be established.

The great abundance of bacteria suggested the query whether they did not originate the rotting, and the mycelium finding a congenial soil came in as a secondary agent, or whether the reverse were true. To decide this several inoculations were made by using an infusion of the bacteria in the same manner as in similar experiments with pear blight. The infusion was made by rinsing some slices of the rotting tomato in water, producing a slight cloudiness from the abundance of the bacteria. As the mycelium in the tomato possessed no spores or loose parts there was little danger of any of it getting into the infusion. The part of the plant to be inoculated was punctured and a drop of the infusion applied. This was tried on the tender ends of the branches and on the young fruit of tomato and several varieties of pepper, also on the shoots of potato and peach and the fruit of pear, in all some thirty experiments. In not a single instance did any rotting occur, or any other effect than would have followed a simple puncture. This at once set at rest any doubt that the bacteria acted in any other capacity than as associates feeding upon the tissues killed by the mycelium.

As already stated, the identity of the mycelium could not be determined. In a paper presented to the Society for the promotion of Agricultural Science at its late meeting in Philadelphia, Dr. Halsted stated that he had traced the rotting of green tomatoes to a fungus inhabiting the leaves of the plant, usually called *Cladosporium fulvum*. This fungus did not occur upon the leaves of tomatoes at the Station, and whether the mycelium of the rot was identical with it could not be ascertained in the absence of spores. The very similar *Cladosporium herbarum* was, however, common upon ripe tomatoes, and also wherever cracks occurred upon partially-ripe fruit. This is an exceedingly common fungus on all dying or dead vegetation, but is not known to cause rots of the nature of the one under discussion.

Our season's work, therefore, decides nothing as to what fungus causes the rot in green tomatoes, except that it is not due to bacteria, or of its mode of attack or the means for controlling it.

ROT IN RIPE TOMATOES.

The work on the premature decay of ripe tomatoes was rather more successful than that of green fruit. The softening and final breaking down of the tissues of ripe tomatoes, accompanied by a strong vinegar odor, was found to be associated with the presence of common yeast (fig. 2), and another yeast-like plant (fig. 3), known as *Oidium lactis*, so named by Fresenius,* who found it upon sour milk. The latter kind formed a snow-white mass wherever the skin of the tomato was broken. It was also found upon the exposed inner surfaces of ripe watermelons and muskmelons that had been cut open and left on the ground to decay. Bacteria were present in all cases. There was no difficulty in producing the same phenomenon of fermentation and disintegration of the tissues in an unaffected, ripe tomato by introducing a drop of the juice from one containing the fungi.

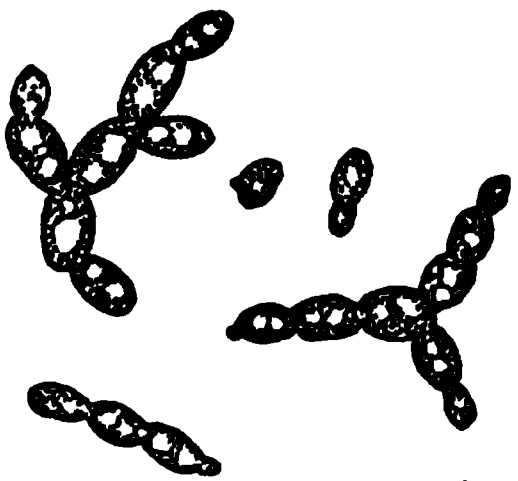


Fig. 2. — Yeast plants from an over-ripe tomato. Magnified 250 times.—Original.

* Beiträge zur Mykologie, 1850-63, p. 23.

Another fungus was found which produced a roughness on the surface of the tomato, and usually made a rather dry mass beneath as far as its abundant white mycelium extended. It corresponds very well with the figure and description, by Saccardo,* of *Gloeosporium phomoides*, which was found upon tomatoes in Italy in November, 1878, and may be identical with it. The fungus develops just beneath and within the epidermis or skin of the fruit, and soon breaks through it and produces great numbers of spores on the ends of the protruding mycelium, as shown in the cut (fig. 4). To the naked eye it only roughens the surface of the fruit by the spores and ragged edges of the broken skin, but upon cutting open the tomato a firm, whitish mass reveals its extent.



Fig 3. — *Oidium lactis* Fres. from a crack in an over-ripe tomato; *a*, the spores seen laterally; *b*, same seen from the end; *c*, chain of spores arising from the mycelium; *d*, germinating spores; *e*, spore-like portion of the mycelium, forming successive branches of the same spore-like nature; *f*, mycelium. The spores are merely short sections of the mycelium, and germinate in the same manner as the mycelium branches, all gradations being found between the two. Magnified 250 times.—Original.

Fig. 4.—Vertical section through the edge of a spot of *Gloeosporium phomoides* Sacc. on ripe tomato, showing the manner in which the mycelium ramifies in the tissues, and penetrates and develops vertical mycelium in the epidermal cells, turning back the skin of the tomato and producing spores on the free surface. Magnified 250 diameters.—Original.

* *Michelia*, II, p. 540, and *Fungi Italici Delincati*, t. 1060.

This fungus was easily transmitted to ripe tomatoes by puncturing the surface and inserting a few spores. The fungus established itself and produced a new crop of spores in from three to four days.

If this disease should become common it might prove a very troublesome one. Several other fungi appeared upon ripe tomatoes in the Station garden, but for the most part so late in the season that it is doubtful if they are of much economic importance.

SMUT IN OATS.

Ustilago segetum, Pers.

It is usually a difficult matter to arrive at any accurate estimate of the loss produced by fungi, being sometimes so great as to cause the total destruction of the crop, but more often an indefinite portion, very difficult to express in figures. In many instances it is looked upon as an inevitable accompaniment of cultivation, varying according to the season, and, therefore, to be taken as a matter of course.

The smut of wheat and oats, from its habit of destroying the whole head or panicle of the plant attacked, is an excellent fungus from which to derive data. By counting the number of healthy and of smutted culms over a certain area, we arrive at a perfectly accurate and just estimate of the loss produced by the smut. The following table shows the results obtained from counting the culms of oats in eight as widely separated areas as possible on the Station farm. Numbers 1 and 2 were growing in the experimental plats, the others in different parts of the fields.

VARIETY.	Sq. ft. of ground	Height of culm	Number of culms.	Per cent smutted.
1. American Triumph	132	44 in.	1237	10
2. Board of Trade	132	48 "	2353	8.5
3. New Australian	40	30 "	892	10.3
4. New Australian	53	46 "	1397	7
5. New Australian	40	46 "	1088	9.2
6. New Australian	40	36 "	1315	15
7. New Australian	60	56 "	1748	7.5
8. New Australian	47	48 "	1183	10.2
Total and average . .	544	44½ in.	11,213	9.5

The total area counted, comprising two square rods, embraced every variation of soil and growth the farm afforded, and it is believed that the counting of a greater area would not have materially affected the result. The appearance of smut as one passed through the fields was no greater than is usually to be seen in any part of the country, at least east of the western plains, and the result of the count, showing a total loss of nine and one-half per cent of smutted grain, is as much a surprise to the writer as it will doubtless be to

others. The apparent strength of the yield in the various areas was in about the relation indicated by the height of the culms, showing that the lightest oats smutted the worst. The smut appeared to also bear a direct ratio to the dryness of the soil.

It should be mentioned in this connection that the thirty varieties of oats growing in the experimental plats were very unevenly affected by smut, some having almost none, the reason for which was not apparent.

Professor Brewer says in the Tenth Census Report of the United States that "neither rust nor smut affects the crop extensively, although either of these diseases occur occasionally," a statement that voices the general belief, but which the above shows to be far from correct. The reason of this discrepancy between casual observation and fact is easily explained by the inconspicuousness of the affected culms.

DISEASE OF CLEMATIS.

The importation of many choice species and hybrids of this charming flower has created a growing demand for it. Its popularity is being somewhat checked, however, by the appearance of a malady that attacks plants of all ages and conditions, has almost stopped its propagation in some places, and threatened serious loss to all who hold either a pecuniary or æsthetic interest in it.

Specimens of diseased plants were sent last year, and again several times the present year, by Mr. Geo. G. Atwood of this place to Professor Riley of the Department of Agriculture at Washington. Professor Riley reported on each lot sent that the roots were swollen in places by the presence of some species of *Anguillula*, a nematoid worm, but that these were not answerable for any marked deterioration of the plants. He also pointed out that a blackened rotting occurred at the crowns, produced, it might be, by a fungus, and that the cause of the disease was doubtless to be looked for in that direction.

Through the kindness of Mr. Atwood, and also of Mr. William Smith of this place, to both of whom I am also indebted for many other favors in the prosecution of my studies, I have been enabled to fully corroborate Professor Riley's supposition, and to learn something of the nature of the fungus.

If a dead plant be removed from the soil, the roots at the point where they arise from the stem will be found to be rotten for an inch or more, giving ample cause for the death of the foliage through cutting off the supply of nourishment. The roots of the clematis are fleshy, nearly as thick as a goose quill, of quite uniform diameter, and with few branches. They possess a tough skin and a central woody thread, but the rest of their thickness is composed of a delicate white tissue (parenchyma), made rigid and brittle by a large deposition of starch and other food materials for the nourishment of the plant. It is in this white tissue that the fungus finds a

congenial soil, soon quite destroying it, and leaving only the tough skin and central woody thread.

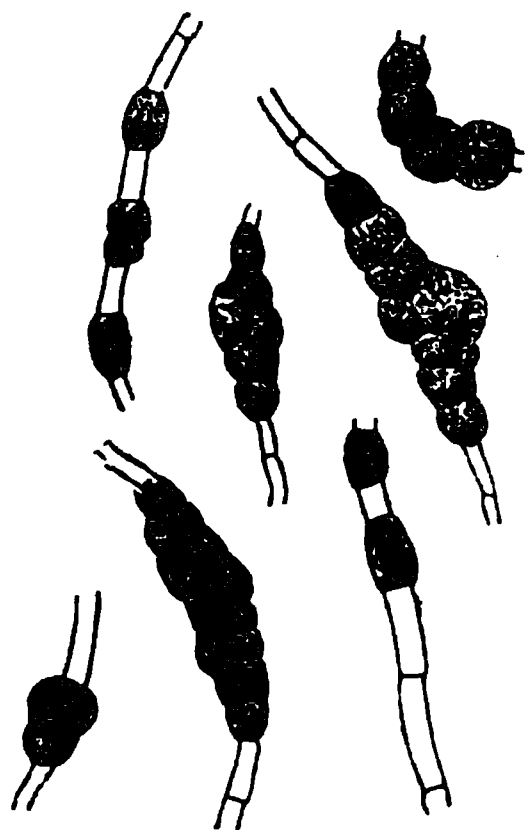


Fig. 5. — Dark brown spores among the colorless mycelium from clematis roots. Magnified 250 diameters. — Original.

on the stems* as occurring in Europe.

Therefore, although having found two forms of spores, one certainly, and the other probably, belonging to the mycelium causing the rotting, it is impossible to determine the name of the fungus, or to give much of its mode of life. One can only say that it is a pyrenomecetous fungus, growing within the roots and causing them to decay. It may possibly grow within the stem also, especially the part beneath the surface of the ground, this part often decaying, but whether from an attack of the same fungus or not, was not ascertained.

This disease is specially troublesome to young plants propagated by cuttings or grafts. In the latter case it is easy to see that the fungus finds access at the cut surface of the root to which the scion is applied, as it is here where the disease first manifests itself. In the case of cuttings it may be it enters the base of the cutting before it becomes calloused, and so to the roots that subsequently grow from it. If the fungus be slow in its growth, a matter of which we have no exact knowledge, it may take some months or even a few years to kill the plant after finding entrance, which would account for some instances of its killing well established plants in isolated spots. But further conjectures are useless.

Too little is known of the life history of the fungus to permit of a remedy being devised. It will, however, be an excellent precaution to use soil in which clematis have not grown for two or three

* *Phoma Clematidis* Sacc. — *Michelia*, II, p. 616.

years, in order that any mycelium or spores of the disease, which it may have previously contained, will first become thoroughly exhausted and dead.

RUST ON CANADA THISTLE.

Puccinia suaveolens, Pers.

There are a few instances in which fungi are beneficial by preying upon noxious plants, and doubtless no more conspicuous example can be given than that of the Canada thistle rust.

This fungus is an endophytic form, pervading the whole plant, and producing its spores on the under surface of the leaves chiefly. It is such a voracious feeder that the thistle is much weakened by it, the leaves being smaller and paler, and the flowers rarely opening, and never setting seed. The fungus may be known by the brown spores which thickly clothe the under surface of the leaves, and which can be partially jarred off as a brown powder.

A thistle infested with rust should be allowed to stand, in order that it may produce as many spores as possible to spread the disease to other plants. No harm, but only good, can thus result, because this form of rust lives upon no other plant, whatever, but the Canada thistle. It will probably never exterminate the thistle, but it will aid in keeping it in check, and should be encouraged.

REPORT OF THE ASSISTANT.

A Classification of Barley and Oats.

FAMILY. The barleys and oats are, botanically speaking, grasses, and belong to the Gramineæ or Grass Family. This family is divided up into many tribes, sub-tribes and genera, of which the barleys and oats each compose a genus. The flowers are hermaphrodite, that is the male and female parts are located in the same flower, and are borne in the spikelets of the head or panicle. The two lowest scales of the spikelet have no flower, but instead act as envelopes for the whole spikelet; these are called empty glumes. The flowers of oats and barley are inclosed within two scales, one above and one below, and the latter, which surrounds the flower and often produces an awn, is termed the flowering glume; the upper scale is called the palet or pale. The palet has no midrib, but two lateral nerves instead, which causes the tip to be slightly divided.. The number of

stamens are three ; pistils two. The fruit has a dry seed covering, is slightly covered with silky hairs, and is called a caryopsis.

The plants of these two genera have round hollow stems, which are divided up into sections by solid nodes or joints. Each leaf tightly clasps the stem or culm ; the clasping portion is known as the sheath. The sheath is divided, and its edges in both barley and oats are more or less fringed with woolly fibers. Where the leaf-blade proper and sheath join, a membranous structure called the ligule clasps the stem. The upper edge of this ligule is always more or less ragged and torn, the condition depending upon the age of the plant. The leaves are parallel veined, and are always, as is the stem, covered to a more or less degree with a bluish bloom. The sheaths are ribbed and the leaves vary in form from lanceolate to linear, and are smooth and sharply pointed. In both genera, the lamina of the upper leaf is longer than the sheath, while the lamina of the lower leaves is shorter than the sheath.

The roots of barley and oats are fibrous, and have a more extensive growth beneath the surface than is generally supposed. In our root washings, the roots of barley have been traced thirty-two inches, and those of oats thirty inches beneath the surface. The roots are extremely slender, and are not perceptibly larger at their extremities than at their union with the stem. A few only of the roots extend their growth beneath the cultivated soil into the subsoil. The plants may be classed as shallow feeders.

Below, the generic characteristics of barley are given under *Hordeum*, and of oats under *Avena*.

GENUS : HORDEUM. Spikelets one-flowered, and arranged in threes. Glumes more in front of the palets than at the sides ; are slender, finely pubescent, usually three-rowed, and awned or pointed. Palet herbaceous. Flowering glumes with one exception (*H. trifurcatum*) tipped with a long awn. The grain is in varieties either encased in a covering, or naked, and oblong in form. The foliage of *Hordeum* is usually rougher to the touch than is that of *Avena*, especially on the lower side of the leaf. The culms are as a rule prominently covered with a bluish bloom, and the nodes are blackish brown or greenish drab in color.

GENUS : AVENA. Spikelets two to four flowered. Glumes large, ovate-lanceolate, seven to eight nerved, white and green striped, with membranous edges, and usually completely encompass all the flowers ; unequal in size and smooth. Flowering glumes frequently awned. Awns both straight and bent or angled. The grain in varieties either is covered or naked ; is two ribbed, covered with a downy pubescence, and lance-linear in form. The panicle is large and partially closed or open, bearing many long peduncles upon which are borne the spikelets ; panicles ovate-lanceolate in form and usually nodding or drooping.

The following classifications are based upon the study of varieties grown at the Station. In cases where sufficient evidence has been obtained, so-called varieties have been reduced to synonyms.

BARLEY.	Hordeum distichum, L. Two-rowed, erect, base upper leaf-blade maroon-red.	Color white.	Chevalier, No. 1. Kinver's Chevalier, No. 2. Two-Rowed, No. 3.
	Hordeum vulgare, L. Six-rowed, erect or decumbent.	White. Palet and glume adherent to seed.	Adams' heavy, No. 4. Four-Rowed, No. 5. Manshury, No. 6. Pringle's New Hybrid, No. 7. Sibley's Imperial, No. 8.
		Black. Seeds loose in glume.	Black Hulless, No. 9.
	Hordeum trifurcatum, Vil. Awnless, but flowering glume tipped with three lobes. Six-rowed.	White. Seeds loose in glume.	Nepaul Barley, No. 10.

A SYNOPSIS OF BARLEY.

BARLEY. (*Hordeum*.)

SPECIES I. *Hordeum distichum*, L. Having only one spikelet at each joint of the rachis of the panicle, with a fertile flower, the two lateral spikelets being reduced to sterile rudiments; the flowers are therefore two-rowed in the spike. Lower palet of each spikelet long awned. The base of the upper leaf blade in this species is usually reddish maroon in color, the bases of the other leaf blades being white. Habit of growth exceedingly erect.

† Seeds white; panicle two-rowed.

VARIETIES, No. 1. Chevalier. Synonym, Sweden Improved. Average height three feet. Culm very glaucous, erect, stout. Leaves lance-linear, frequently attaining a length of thirteen inches, and averaging one-half an inch wide. Panicle erect or very slightly nodding; average length three and one-half inches; compact, and usually of about the same size; berry with awn often attaining a length of nine inches; foliage very abundant and extremely healthy; berry of good size and easily separated from panicle in threshing; a French variety originated by M. Chevalier, from whom it takes its name. Was introduced into England many years ago where it is extensively cultivated, and probably reached the United States by way of Canada.

No. 2. Kinver's Chevalier (Bliss). Average height three feet six inches. Culm very erect and strong. Leaves linear, often exceeding twelve inches in length, but not averaging one-half an inch in width. Panicles average five inches long, nodding, narrower than Chevalier; berry of medium size, with awn frequently exceeding ten inches in length. Stools very abundantly. Late in the season is very susceptible to red-rust, so that at time of harvesting the straw is quite weak. Not as vigorous as Chevalier. An English variety.

No. 3. Two-Rowed (Bliss). Average height three feet. Culm erect and stout. Leaves linear, attaining a length of ten inches, not averaging one-half an inch in width. Foliage very green and healthy, although culms rather susceptible to rust. Culms are more glaucous late in the season than any other of our varieties. Panicles average four and one-half inches long; nodding; berry of medium size, and with awn attaining a length of over nine inches.

SPECIES II. *Hordeum vulgare*, L. Spikelets three at each joint of rachis, containing perfect flowers. Flowering glume long awned.

† Seeds white, and adherent to the palet and glume; panicle six-rowed.

No. 4. Adams's Heavy (Sibley). Average height two feet six inches. Culm usually erect, but not stout. Leaves often exceeding ten inches long, and attaining three-fourths of an inch wide; lance-linear; base of leaf-blade white. Panicles average slightly over three inches in length, droop somewhat, and berry with awn attains a length of seven inches or more; berry of medium size. Stools well. This variety is more subject to disease than any other barley tested at the Station.

No. 5. Four-Rowed (Bliss). Average height three feet. Culm both erect and decumbent, medium stout. Leaves lance-linear, taper pointed, attaining a length of eleven inches, and over one-half an inch in width; base of leaf-blade white. Panicles average three and one-half inches long, usually drooping; berry of medium size, and with awn reaching six inches in length. Stools fairly well.

No. 6. Manshury. Average height two feet nine inches. Culm erect as a rule, fairly stout. Leaves lance-linear, taper pointed, averaging nine inches long, and often exceeding three-fourths of an inch wide; base of blade white. Panicles average four inches long, or with awns six inches; drooping or upright; berry of fair size. Stools well. Retains its erect habit of growth to harvesting. This variety was first brought to this country* from Germany in 1861 by Dr. Hermann Grunow, of Mifflin, Wisconsin. It is said to have been originally obtained by a scientific traveler in the mountainous parts of eastern Asia (Mandschurey), about 1859, and was obtained by Dr. Grunow from Ferdinand Duehlke, of Erfurt, at present director of the Agricultural School at Potsdam, and gardener to the Emperor at Sans Souci.

* First Annual Report of the Wis. Ag. Experiment Station, page 18.

No. 7. Pringle's New Hybrid. Average height three feet. Culm erect, slender. Leaves usually erect along the culm, exceeding one-half an inch in width, and nine or more in length; lance-linear, and at base of blade white. Panicles average nearly four inches long, and somewhat nodding; berry small, with awn attaining nine inches in length. Stools well, and produces a great abundance of foliage, much of which near the ground dies before the plant reaches maturity. As the period of ripening is approached, this variety shows great weakness of the culm.

No. 8. Sibley's Imperial. Average height three feet three inches. Culm very erect. Leaves lance-linear, often attaining a length of twelve inches, and a width of slightly over one-half inch; usually erect along the culm. Panicles average four and one-half inches long, nodding; berry small, with awn often exceeding seven inches. This variety stools freely, and produces an abundance of foliage. As maturity approaches, the culms become weak and decumbent. Claimed to be a cross between the common six-rowed and Chevalier by F. H. Horsford in 1881, and first disseminated by Hiram Sibley & Co., Rochester, N. Y., in 1883.

†† Seeds black, or grayish-black, and falling from the palet and glume upon being threshed.

No. 9. Black Hulless. Average height, two feet six inches. Culm weak and often decumbent; leaves broadly lance-linear, oftentimes reaching nearly one inch in width, and ten inches in length; basal portion of blade white. Panicles average three inches long, nodding; berry with awn attaining a length of seven inches; Stools sparingly. This variety is the weakest and most decumbent of any that has been grown at the Station.

SPECIES III. *Hordeum trifurcatum*, Vil. Six-rowed, there being three spikelets on each joint of the rachis; palets awnless, but terminating in a three-lobed or eared point, the central lobe assuming a hooded form, while the lateral lobes are merely ears which are usually pointed and of variable length. The grain is not firmly adherent to the palet and glume at maturity, but becomes loose upon being threshed.

VARIETY, No. 10. Nepaul Barley. Average height, two feet three inches. Culm stout, and slightly decumbent at the basal portion, then becoming erect. Leaves lance-linear, taper pointed, attaining a length of twelve inches and a width of one and three-fourths of an inch; panicles compact, erect or slightly nodding, averaging three and one-fourth inches long; tip spikelets, rudimentary or inclined to sterility or partial development; berries uneven in size, there being many small ones, evidently produced from the weak spikelets at the tips of the panicles. Color of seed amber or dark brown. Supposed to originally have come from Nepaul. Vilmorin, in "Le Bon Jardinier" for 1884. mentions its culture in France as far back as 1836-1838.

A SYNOPSIS OF OATS.

OATS.	Avena sativa L. 2-3 flowered. Empty glumes completely enclosing flowers until maturity. Pedicels of flowering glumes short. Flowering glume remaining on berry.	Open panicle.	Black or dun.	{ Berry long.	{ Black Champion, No. 1.
		Closed panicle.	White.	{ Berry long and taper pointed.	{ Alexander's No. 2. Challenge, No. 3. Golden, No. 3. Probsteier, No. 5. Seizure, No. 6. Washington, No. 7. White Champion, No. 8. " Eureka, No. 9. " Probsteier, No. 10. " Schöenen, No. 11. Yellow or Golden Prize, No. 12.
			Black or dun.	{ Berry long.	{ Board of Trade, No. 13. New Australian, No. 14. White Australian, No. 15.
			White.	{ Berry long.	{ Black Tartarian, No. 16. Mold's Ennobled, No. 17. American Triumph, No. 18. White Novelty, No. 19. " Russian, No. 20. " Zealand, No. 21.
	Avena nuda, L. 4-5 flowered. Empty glume very large. Seed falling from flowering glume at maturity.	Open panicle.	{ White.	{ Berry very small.	{ Chinese Hulless, No. 22. Pringle's Excelsior, Hull ess, No. 23

OAT. (*Avena*.)

SPECIES 1. *Avena sativa*, L. Spikelets from two to three flowered and completely enclosed by the empty glumes until maturity. Flowering glumes strong and tough, becoming hard and tightly enclosing the seed; rounded on the back, and usually awned at or near the center, toward the tips, the awn usually being longer than the glume. Flowers attached to one another by short, stout peduncles.

SUB-SPECIES. (a) Panicle open at maturity, the secondary branches being equally spreading on all sides from the rachis.

† Color black or dun.

VARIETIES. No. 1. Black Champion, (Rural New-Yorker). Average height three feet three inches. Culm strong, erect. Leaves very abundant, averaging slightly over one-half an inch in width, and often exceeding thirteen inches in length; base of blade white. Average length of panicle ten inches; the flowering glume as a rule awned. The number of panicles produced in comparison to plants

is small and the panicles mature rather late. Berry of a dark dun color, and not fairly black; size from medium to small. This oat was imported from France by F. H. Horsford several years ago, and is known in that country as *Noire de Brie*.

†† Color white.

** Berry long and taper-pointed.

No. 2. Alexander's No. 2. Average height three feet three inches. Culm very erect and stout. Leaves often exceeding sixteen inches in length, averaging slightly over one-half an inch wide; very slightly white at the base of the leaf-blade. Average length of panicle nine inches. Berry large, but does not separate easily from the spikelet. A cross of Excelsior on Probsteier, as claimed by O. H. Alexander, the originator.

No. 3. Challenge. Average height three feet six inches. Culm very erect and stout. Leaves lance-linear, attaining a length of twelve inches, and averaging one-half an inch in width. Panicles quite erect and averaging nine inches in length. Berry of medium size; awns tenacious.

No. 4. Golden. Average height three feet three inches. Culm very erect and stout. Leaves occasionally exceed thirteen inches in length, and average one-half inch wide; linear; sparingly white at base of leaf-blade. Panicles very even in size; average length seven inches; flowering glumes usually lacking awns.

No. 5. Probsteier (Gregory). Average height three feet three inches. Culm very erect; medium stout. Leaves partially erect with full development, oftentimes extending to and above the panicles, attaining a length of twelve inches and an average width of one-half an inch; white at base of leaf-blade; lance-linear. Average length of panicles eight inches. Berry of good size and plump.

No. 6. Seizure (Sibley.) Average height three feet six inches. Culms stout and erect. Leaves linear, averaging one-half an inch in width, and frequently exceeding eleven inches in length; base of leaf-blade squarely marked white. Average length of panicles eight inches, and as a rule quite equal in size. Berry of medium size.

No. 7. Washington. Average height three feet three inches. Culm erect, but becomes weak toward maturity. Leaves occasionally exceed twelve inches in length, having an average width of one-half an inch; lance-linear; base of leaf-blade white; habit of growth erect along the culm, and often extending to and above the panicle at maturity. Average length of panicle eight inches.

No. 8. White Champion. Average height three feet four inches. Culm occasionally decumbent, and slender. Leaves linear, sometimes exceeding thirteen inches long, although generally short, and having an average width of one-half an inch; base of leaf blade slightly white. Average length of panicles eight inches. Berry long and slim.

No. 9. White Eureka (Sibley). Average height three feet three inches. Culm generally erect, but sometimes decumbent; slender. Leaves linear, often exceeding thirteen inches in length, and averag-

ing less than one-half an inch wide. Average length of panicles eight inches. Berry long and thin. Introduced by A. H. Goddard, Fort Atkinson, Iowa, and originally from Germany, having been brought to Iowa by German immigrants.

No. 10. White Probesteier. Average height three feet two inches. Culm erect, but occasionally decumbent; slender. Leaves linear, averaging less than one-half an inch in width, and at times exceeding eleven inches in length; base of leaf-blade slightly white. Average length of panicle eight inches; berry of good size.

No. 11. White Schoenen. Average height three feet three inches. Culm erect or decumbent; not stout. Leaves linear, averaging one-half an inch in width, and occasionally exceeding twelve inches in length; white base of leaf-blade not very pronounced. Average length of panicles eight inches; berry large. Imported from Germany in 1868 by Department of Agriculture.

No. 12. Yellow or Golden Prize. Average height three feet. Culm weak, often decumbent. Leaves linear, averaging one-half an inch in width, and occasionally exceeding thirteen inches in length; slightly white at base of leaf-blade. Average length of panicle seven inches; berry quite large and long.

**Berry short, plump, and abruptly pointed.

No. 13. Board of Trade (Sibley). Average height three feet six inches. Culm erect, and strong until maturity. Leaves lance-linear, attaining a length of thirteen inches, with an average length of one-half an inch; slightly white at base of leaf-blade. Panicles average nine inches in length.

No. 14. New Australian. Synonyms: Race Horse (Greg). Average height three feet six inches. Culm fairly stout, and usually erect, though sometimes decumbent. Average width of leaves slightly over one-half inch, and in length occasionally exceeding fourteen inches; lance-linear; white at base of leaf-blade. The foliage has an erect growth along the stem, and reaches to, and often above the panicles when at maturity.

No. 15. White Australian (Sibley). Synonyms: Welcome (Greg), White Belgian (Greg.). Average height three feet ten inches. Culm fairly stout, and slightly decumbent at the base. Leaves averaging slightly over one-half an inch wide, and occasionally exceeding fourteen inches in length; slightly white at base of leaf-blade. Average length of panicles, nine inches; color very light green.

SUB-SPECIES (b). Panicle closed, or but slightly open at maturity, the branchlets being erect along the rachis of the panicle.

† Color black or light dun.

VARIETIES. No. 16. Black Tartarian. (Sibley). Average height three feet three inches. Culm erect and very stout. Average width of leaf over one-half an inch, and exceeding at times thirteen inches in length; base of leaf-blade slightly white. Panicles compact, erect, averaging nine inches in length. Berry not always black, but more often of a dark dun color; size medium. This variety has long been

cultivated in the low-lying districts of Scotland and England, and its grain is said to make a superior class of meal.

No. 17. Mold's Ennobled. Synonyms, Mammoth Russian; Mold's Selected Black Tartarian (Bliss). Average height two feet eight inches. Culm erect, medium stout. Leaves average less than one-half an inch in width, attain a length of ten inches; linear, taper pointed; slightly white at base of leaf-blade. Average length of panicle five and one-half inches. This variety produces previous to the growth of the culms, a dense, foliaceous mat on the surface of the ground. The seeds are of large size, and the tips of the flowering glumes are as a rule quite ragged. Said to be an improved form of Black Tartarian.

†† Color white.

VARIETIES. No. 18. American Triumph (Gregory). Average height three feet six inches. Culm very stout and erect. Leaves lance-linear, attaining a length of nearly seventeen inches, and an average width of over one-half an inch; sparingly white at base of leaf-blade. Panicles average ten inches in length. Claimed to be an impregnation of the Waterloo, with pollen of the Excelsior, by C. G. Pringle, and introduced by B. K. Bliss & Sons, New York.

No. 19. White Novelty (Sibley). Average height three feet six inches. Culm medium stout and erect. Average width of leaves one-half inch, and in length occasionally exceeding fourteen inches; bases of leaf-blades so slightly white not perceptible, unless carefully looked for; linear. Average length of panicles nine inches; flowering glume not usually awned. Berry of medium size, long, but not very plump. Introduced by A. H. Goddard, Fort Atkinson, Iowa, and originally brought to this country by German immigrants, settling in Iowa.

No. 20. White Russian (Gregory). Average height three feet six inches. Culm erect, medium stout. Leaves linear, attaining a length of fourteen inches, and an average width of less than one-half an inch; base of leaf-blade not noticeably white. Average length of panicles nine and one-half inches; flowering glumes rarely awned. Berry of good size, being long, but not markedly plump.

No. 21. White Zealand (Gregory). Average height three feet six inches. Culms usually erect. Leaves linear to lance-linear, having an average width of one-half an inch, and a maximum length of fifteen inches; white spot at base of leaf-blade nearly absent. Berry of medium size. It is said to have been introduced from Russia.

SPECIES II. *Avena nuda*, L. The spikelet contains one or two or more flowering glumes than does *sativa*, and the flowers are more widely separated, as the pedicels of the flowering glumes are more elongated. The empty glumes are longer than those of *sativa*, and at maturity they are unable to hold the flowers, which to a slight extent hang pendent from the glumes by their angled or elbowed pedicels. The berry becomes easily detached at maturity, and falls

in a naked condition from the flowering glume. Empty glumes very large. The main axes of the panicles, and peduncles of spikelets, delicate and wiry. Panicle spreading. Color of seed, white.

VARIETIES. No. 22. Chinese Hulless (Gregory). Average height two feet eight inches. Culm medium stout, erect to maturity, when it loses the erect form of growth. Leaves average less than one-half an inch in width, exceeding twelve inches in length; linear; sparingly white at the base of leaf-blade. Average length of panicles seven inches. Pedicels of flowering glumes not as strongly elbowed as in the next variety. Berry very small, but does not loosen well from the glume in threshing. Doubtless from Europe, where it is known and cultivated to some extent as the Skinless Oat, the grain being ground into meal. The most ancient writings referring to *Avena nuda* are Chinese, dating from 618 to 709 A. D., where references are made to a skinless oat.

No. 23. Pringle's Excelsior Hulless. Synonym: Pringle's Hybridized Hulless. Average height of plant three feet three inches. Culm erect, and strong until late in the growing season, when it evinces a disposition to weakness. Average width of leaves one-half inch, with an occasional length of twelve inches; lance-linear; white at base of leaf-blade. Average length of panicles eight inches; very much drooping; but few glumes awned. Berry small and inferior. A cross of the common Hulless Oat, on the Excelsior, using the latter for pollen, as claimed by C. G. Pringle, the originator.

NOTES ON BARLEY.

No. 1. Chevalier. Foliage very abundant and healthy. An extremely stout and vigorous variety.

No. 2. Kinver's Chevalier (Bliss). Foliage abundant, healthy, and rusting but slightly. Stools abundantly. Did not smut. Late in the season the culms were very badly affected with rust. At harvesting straw weak. Panicles nodding, and not evenly maturing.

No. 3. Two-Rowed (Bliss). Stools fairly well. Foliage very green and healthy. Culms somewhat affected by rust, and very erect at the cutting period.

No. 4. Adams's Heavy (Sibley). Stools very well. Smutted very badly; worse than any other. Rusted quite severely. Plant weak and very subject to disease. Decumbent at cutting.

No. 5. Four-Rowed (Bliss). Stools fairly well. Slightly afflicted with rust and smut. Straw not very stout, and somewhat decumbent at cutting.

No. 6. Manshury. Stools fairly well. Afflicted with rust and smut very slightly. Growth very erect and even until harvesting.

No. 7. Pringle's New Hybrid. Stools well, and produces a great deal of foliage, much of which near the ground dies before maturing.

riety is reached. Late in the season the culms became badly affected with rust. Growth weak and decumbent. No smut.

No. 8. Sibley's Imperial. Stools very freely. Foliage abundant and excellent. Late in the season the culms became badly affected with rust, as in No. 7, becoming weak and decumbent. Free from smut.

No. 9. Black Hulless. Stools sparingly. Not troubled with smut, and foliage generally free from rust. Culms weaker and more decumbent than any other variety.

No. 10. Nepaul. Stools well and produces a large amount of excellent foliage, which would serve as a very desirable fodder. Quite free from disease. Does not lodge, even to cutting.

NOTES ON OATS.

No. 1. Black Champion (R. N. Y.). Foliage very profuse, such as would make superior fodder. Not affected with smut. Tallest plant three feet eight inches. Longest panicle twelve inches. Straw weak, and not bright.

No. 2. Alexander's No. 2. Foliage very healthy and vigorous, being but slightly affected with rust. Stools plentifully. Tallest plant three feet eleven inches. Longest panicle twelve inches. Straw weak.

No. 3. Challenge. Foliage fairly abundant. Stools plentifully. Rusted very badly late in the season. Smutted badly. Awns hold tenaciously to the flowering glumes. Tallest plant four feet. Longest panicle thirteen inches. Partially lodged at cutting.

No. 4. Golden. Stools very well. Foliage abundant, but rusted rather badly. Many heads smutted. Erect to harvesting.

No. 5. Probsteier (Gregory). Stools evenly and fairly well. Tallest plant four feet. Longest panicle eleven and one-half inches. Straw weak, and lodged at cutting. Foliage abundant and rusty. Panicles smutty.

No. 6. Seizure (Sibley). Stools bountifully, producing an abundance of foliage; rusted badly. Panicles smutted quite extensively. A variety quite susceptible to disease. Tallest plant four feet and one-half inch. Longest panicle eleven inches. Panicles do not mature evenly. Lodged to some extent at cutting.

No. 7. Washington. Stools excellently, and produces an abundance of foliage which is rather subject to rust. Smutted slightly. Tallest plant four feet one inch. Longest panicle twelve and one-half inches. Does not mature evenly. Straw weak and partially lodged at cutting.

No. 8. White Champion. Foliage abundant and usually healthy. Panicles suffered some from smut. Lodged at cutting, but not badly. Tallest plant four feet two inches. Longest panicle twelve inches. Thrashes in good form.

No. 9. White Eureka, (Sibley). Stools fairly well. Produces considerable foliage, which is inclined to rust badly, especially on

the older leaves. Panicles subject to smut. Slightly lodged at cutting. Tallest plant four feet two and one-half inches. Longest panicle eleven inches. Thrashes in good form.

No. 10. White Probesteier. Does not stool extremely well, but produces a fair amount of foliage, which is as a rule healthy. Smutted slightly. Lodged to a small extent at cutting. Tallest plant three feet eleven inches. Longest panicle twelve and one-half inches. Thrashes in good form.

No. 11. White Schoenen. Does not stool very well. Foliage abundant and healthy, showing but little rust. Inflicted with smut. Tallest plant three feet eleven inches. Longest panicle eleven inches.

No. 12. Yellow or Golden Prize. Foliage not very vigorous or abundant. Does not stool plentifully. Was not troubled much by either rust or smut. Tallest plant three feet nine inches. Longest panicle nine inches. Slightly lodged at cutting. Thrashes in good form.

No. 13. Board of Trade. Stools very well. Was disposed to rust and smut badly. Rusted more than almost any other variety. Tallest plant four feet two inches. Longest panicle eleven inches. Partially lodged at cutting.

No. 14. New Australian. Stools abundantly. Leaves rusty, and panicles smutted slightly. Straw weak and badly lodged at cutting. Tallest plant four feet two and one-half inches. Longest panicle thirteen inches.

No. 15. White Australian. Stools well. Foliage fairly abundant, and rusted very badly. This variety has smutted more than any other at the Station. Straw weak, and badly lodged at cutting. Tallest plant four feet six inches. Longest panicle fourteen inches.

No. 16. Black Tartarian (Sibley). The first "side-head" to be harvested. Did not smut, and was not badly troubled with rust. Tallest plant three feet nine inches. Longest panicle twelve inches. Erect at cutting.

No. 17. Mold's Ennobled. Stools abundantly. No smut, and a minimum amount of rust. At cutting period, straw weak. Tallest plant three feet four inches.

No. 18. American Triumph (Sibley). Stools abundantly, and but few panicles produced from a stool. Smutted some; rusted slightly. Awns cling tenaciously to flowering glumes. Straw erect at cutting. Tallest plant four feet one inch.

No. 19. White Novelty (Sibley). Foliage very abundant, and slightly affected with rust. Stools well. Smutted slightly. Straw fairly stout at cutting. Tallest plant four feet two and one-half inches. Longest panicle thirteen inches. Thrashes in good form.

No. 20. White Russian (Gregory). Stools fairly well, and produces an abundance of foliage. Rusted slightly, and smutted but a little. Tallest plant four feet two inches. Longest panicle thirteen inches. Straw erect and stout at cutting. Thrashes in good form.

No. 21. White Zealand (Gregory). Stools abundantly, and produces a profusion of healthy foliage. Rusted and smutted slightly.

Straw unusually stout and erect at cutting, and but little lodged. Tallest plant four feet one and one-half inch. Thrashes in good form.

No. 22. Chinese Hulless (Gregory). Stools poorly, and rusted badly. Smutted slightly. Partially lodged at cutting. Tallest plant three feet ten inches. Longest panicle ten inches. In handling in the field, many grains fell from the spikelets.

No. 23. Pringle's Excelsior Hulless (Thorburn). Stools well. Foliage fair, but rusty to some extent. No smut. Lodges badly. In thrashing, while many berries are detached from the flowering glumes in a naked condition, many others retain the glumes, thus leaving the grain after thrashing in a very undesirable condition. This remark also applies to No. 22.

BARLEY.

NAME.	Vegetated.	Days from planting.	Average height.	Average length of panicle.	Longest pan- icle.	When cut.	Straw and grain.	Yield of grain.	Yield calculated to the acre.	Kind of pan- icle.
*Adams' Heavy.....	May 5	9	30 in.	3 in.	9 in.	Aug. 3	10 lbs. 5 oz.	4 lbs. 11 oz.	12 bus. 37 lbs.	Bearded.
Black Hulless.....	" 5	9	30	3	7	13	9	3	34	"
Chevallier.....	" 5	9	45	3.5	9	14	12	3	35	"
Four-Rowed.....	" 5	9	38	3.5	6	4	12	5	45	"
Kinver's Chevallier.....	" 5	9	42	5	10	18	12	4	37	"
Mansbury.....	" 6	10	33	4	6	4	10	5	43	"
Nepaul.....	" 5	9	27	3.25	9	12	9	3	27	Beardless
Pringle's New Hybrid.....	" 5	9	36	4	9	9	14	5	49	Bearded.
Sibley's Imperial.....	" 6	10	38	4.5	7	14	11	4	37	"
Sweden Improved.....	" 12	16	36	3.5	9	18	3	2	53	"
Two-Rowed.....	" 6	10	36	4.5	9	9	8	2	24	"

* All the varieties were planted on April 28

OATS.

NAME.	Vegetated.	Days from planting.	Average height.	Smallest plant.	Average length pawls.	Longest pan- icle.	When cut.	Straw and grain.	Yield of grain.		Yield calculated to the acre.
									lbs.	oz.	
..	May	8	39	47	9	12	Aug.	12	3	48	48 bus. 7
..	..	6	42	49	10	14	..	10	2	38	.. 30
..	..	10	39	44	10	13	..	11	1	18	.. 23
..	..	12	39	45	9	13	..	9	4	59	.. 23
..	..	6	43	50	9	11	..	13	7	61	.. 27
..	..	6	43	48	9	13	..	6	4	62	.. 27
..	..	9	43	44	7	10	..	8	10	62	.. 15
..	..	10	39	46	7	11	..	11	4	23	.. 23
..	..	10	39	51	8	11	..	7	1	23	.. 23
..	..	10	39	47.5	8	11	..	1.5	2	36	.. 5.5
..	..	9	39	47	5.5	..	..	12.5	9	59	.. 15
..	..	10	32	40	5.5	..	..	14.5	3	53	.. 2
..	..	10	32	40	10	13	..	8	5	72	.. 7
..	..	10	42	50.5	10	13	..	12	4	63	.. 19
..	..	9	39	48	8	11	..	7	4	61	.. 19
..	..	10	44	49.5	10	14	..	13	3	49	.. 12
..	..	10	42	49	8	12.5	..	6.5	10	72	.. 20
..	..	10	39	49	8	13.5	..	9	5	75	.. 23
..	..	10	42	54.5	11	15.5	..	9	11	64	.. 4
..	..	10	46	54	9	14	..	15	9	63	.. 24
..	..	10	46	55.5	11	15.5	..	8	7	73	.. 24
..	..	10	40	50	8	13	..	7.5	10	78	.. 24
..	..	9	39	50.5	8	11	..	11	10	105	.. 30
..	..	10	42	50.5	8	13	..	5	9	87	.. 2.5
..	..	10	38	47	8	13.5	..	3	8	82	.. 29
..	..	10	42	50	9.5	13	..	7	8	84	.. 17
..	..	10	42	47	6	11	..	3	8	80	.. 17
..	..	10	42	49.5	9.5	12	..	10.5	6	74	.. 14
..	..	9	38	45	7	9	..	14.5	6	..	..

* All the varieties were planted on April 20.

BARLEY.

NAME	Average num- ber of counted grains per oz.	Average number of grains calcu- lated per bushel.	Color of grain.	Appearance of grain.
Adams' Heavy	814	620, 852	White	Very good.
Black Hulless...	705	541, 440	Black or deep brown	Very good; plump.
Chevalier	646	496, 128	White	Good; size medium
Kinver's Chevalier	652	500, 736	"	Good.
Mansbury	837	642, 816	"	Fair.
Nepaul	837	642, 816	Amber, often dark brown.	Fair; size very variable.
Four-Rowed	768	589, 824	White	Fair; size medium
Pringle's New Hybrid	1,168	897, 024	"	Small, but good.
Sibley's Imperial	1,190	913, 920	"	Small, but good
Sweden Improved	720	552, 960	"	Good; large.
Two-Rowed	755	579, 840	"	Good; size medium.

OATS.

NAME.	Average num- ber of counted grains per oz.	Average number of grains calcu- lated per bushel.	Color of grain.	Appearance of grain.
Probsteler	1,303	615,836	White.	Large and good.
Race Horse	1,243	636,416	"	Good
Belzuro	1,603	609,376	Dun, few black.	Fair to inferior.
Washington	1,303	607,136	"	Good.
Welcome	1,341	636,592	White.	Good; plump.
White Australian	1,256	644,046	"	Fair.
Belgian	2,056	1,057,708	"	
Eureka	1,514	775,168	"	
Champion	1,096	556,082	Very light dun.	
Novelty	1,131	573,922	"	
Probsteler	1,031	553,472	White.	
Race Horse	2,037	1,033,544	"	
Belzuro	2,207	1,129,364	Bronze.	
Washington	1,233	631,504	White.	
Welcome	1,134	590,604	"	
White Australian	1,226	633,832	"	
Belgian	1,396	709,632	"	
Eureka	1,040	532,450	"	
Champion	1,073	548,304	"	
Novelty	1,105	566,760	"	
Probsteler	1,013	518,656	"	
Russian	1,166	596,902	"	
Schonen	1,173	602,136	"	
Zealand	1,057	541,184	"	
Yellow or Golden Prize	1,166	596,480	"	
	1,013	518,656	"	
	1,133	606,184	"	
	966	494,592	"	

All of the above calculations were made from actual counting. Ten separate ounces of each variety were counted, and the average is given in the table above. A very close estimate of the relation existing between the different ounces, which has not varied to any considerable extent in all the varieties, may be formed from the following figures, which are given as illustrative of the weights of ten ounces of several varieties:

	Alexander's No. 2 Oats.	Pringle's Hybridized Hulless oats	White Probsteler oats.	White Zeland oats.	Sibley's Imperial barley.	Two- Rowed barley.
1	1, 200	2, 284	1, 030	1, 168	1, 223	783
2	1, 255	2, 174	1, 056	1, 181	1, 208	743
3	1, 155	2, 288	1, 035	1, 183	1, 186	733
4	1, 217	2, 138	1, 032	1, 183	1, 215	748
5	1, 221	2, 091	1, 054	1, 180	1, 169	750
6	1, 207	2, 261	1, 108	1, 165	1, 149	757
7	1, 192	2, 268	1, 062	1, 196	1, 227	782
8	1, 217	2, 200	1, 027	1, 178	1, 189	750
9	1, 183	2, 200	1, 077	1, 211	1, 194	759
10	1, 188	2, 169	1, 089	1, 180	1, 142	748

The weights of the bushels calculated were based upon thirty-two pounds as the standard for oats, and no change in the number of pounds per bushel was made in the case of the hulless varieties. The weight of barley was estimated at the rate of forty-eight pounds to the bushel.

REPORT OF THE FARMER.

Much work has been done on the farm in the way of improvement, many of the fences which were in a poor condition having been removed, and the balance of the fencing that was left put into thorough repair. The old hawthorn hedge upon the west side of the farm has been grubbed up, the ground leveled and replaced by a barbed wire fence, two posts to the rod, a top rail of hemlock, and three wires. This, on account of the length (over 100 rods) and the size and ragged condition of the hawthorn plants, was a work of some magnitude and considerable expense. An acre of osier willows has been stubbed out and the refuse burned, a sufficient plat being left growing for the purposes of the farm. Stones have been removed from the fields in quite large quantities and used in building the embankments and abutments of the bridge which has been built to span the ravine which separates the farm into two portions. Much clearing work of a miscellaneous character has also been accomplished upon various parts of the farm and experimental grounds.

The crops grown on the Station farm this year comprise wheat,

twenty-four and nine-fortieths acres ; oats, six and three-eighths acres, and corn, five and one-quarter acres. The average yield was

Wheat, 29.50 bushels per acre.

Oats, 57.41 " "

Corn, 40. " "

The corn crop was materially diminished by the ravages of the cut worm.

Eleven acres of ground, planted in winter wheat, was thoroughly summer followed, and over 100 loads of quack grass roots were removed and destroyed. About eleven and one-half acres have been fall plowed for spring crops.

The farm is now approaching a condition of efficiency, but much work of a miscellaneous character remains to be done. The original foulness of the land has been somewhat overcome, but as the coarser weeds will have to be removed by hand, much work of considerable difficulty remains, while we are at present dependent upon summer fallowing for cleaning our fields of the miscellaneous weed crops. • •

The cow barn has been repaired and placed in good condition, both for the use of cattle and for storage. Some repairs have also been made upon the horse barn. The teams have been employed to a considerable extent in moving manure, while the experimental department has given them employment at times when they were not required upon the farm.

APPENDIX.

Readings of the maximum and minimum thermometers at 7 A. M., 1883.

1883.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.....	31	20.5	37	12	27	15	28	19	53	31	64	43	64	46	76.5	56	77	59	49	32	55	36	43	20
2.....	31	19	18	8	58	24	28	21	59	37	74	42	74	58	81	60	77	55	53	33	45	32	40	20
3.....	34	13	30	6	42	13	37	25	72.5	38	85	47	85	62	79	56	75	50	48	40	36	39	39	11
4.....	34	14	47	.....	22	11	40	31	65	36	80	58	80	63	70	54	58.5	49	51	35	50	44.5	28	16
5.....	11	0	33	11	21	4	50	45	60	35	89	52	89	67	70	55	72.5	45	48	34	55	42	21	21
6.....	8	2	25	2	21	.....	53	37	59	42	86	60	86	66	73	54	64	43	51	34	64	46	35	21
7.....	31	6	33	5	38	14	50	32	61.5	39	84	65.5	84	68	73.5	50	70	47	50	38	64	43	32	32
8.....	34	11	33	13	18	.....	35	34	64	44	88	55.5	88	55	77	51	68.5	50	51	43	45	52	.....	.....
9.....	24	12	26	12	19	.....	52	35	62	44	61	53	61	50	79	52	62	41	60	45	53	37	56	35
10.....	11	-7	31	6	37	8	67	44	55	42	72.5	53	72.5	47	80	57	53.5	38	73	50	68	43	52	28
11.....	12	-9	26	.....	36	.....	66	36	87	42	78	58	78	55	82	59	59	37	78	50	50	49	39	25
12.....	17	1	34	20	25	.....	41	35	54	35	84.5	60	84.5	64	84	57	68.5	41	76	48.5	51	39	26	25
13.....	24	.....	31	2	31	15	41	35	60	34	77	47	77	54	72	56	.....	.....	63	53	43	58	32	32
14.....	40	.....	36	4	31	19	56	47	49	31	73.5	47	77	57	72	50	.....	.....	67	56.5	43	56	32	4
15.....	24	14	38	13	53	21	63	52	50	38	74	47	74	57	71	46	.....	.....	67	37	33	44	4	4
16.....	23	6	39	32	34	13	75	48	56	38	73	54	73	62	76	50	76.5	41	43	38	33	44	3.5	3.5
17.....	26	.....	48	30	27	13	53	42	48	33	82	58	82	63	73	55	80	50	44	25	33.5	15	5	14
18.....	44	.....	48	14	48	24	63	43	63	39	83	65	83	56	84.5	58	61	45	50	25	23.5	17	21.5	9
19.....	29	13	25	12	61	7	60	43	74	42	69	63	69	52	78	63	66.5	44	52	35	43	33	20	20
20.....	31	.....	30	11	17	7	62	35	78	57	70	57	70	50	85	66	69	48	52	49	54	21	11	11
21.....	42	.....	38	16	20	7	65	38	73	40	74	56	74	52	84	64	72.5	51	50	37	55	24	15	15
22.....	22	.....	30	13	23	9	65	37	73	39	66	63	66	52	82	62	77	54	48	26	70	21	12	12
23.....	6.5	-3	38	13	23	9	65	37	73	39	66	63	66	52	82	62	77	54	48	26	70	21	12	12
24.....	8	-7	37	14	25	10	41	30	45	40	75	55.5	75	53	92	64	73	52	46	29	68	15	-7	-7
25.....	21	.....	38	14	25	10	41	30	51	40	82	56	75	53	78.5	64	70	52	49	38	49	30	-5.5	-5.5
26.....	18	-3	41	.....	30	14	40.5	28	67	46	84	64	80	54	73	53	62	52	50	34	50	37	22	22
27.....	31	.....	41	19	39.5	14	38	35	83	55	80	63	76.5	51	71	51	58	38	46	39	49	37	21	21
28.....	41	.....	27	7	37	20	52	36	83	52	81	63	80	58	71	47	59	39	47	37	34	37	15	15
29.....	31	.....	.....	.....	28	20	56	36	70.5	52	81	62	81	55	71	47	70	44	47	37	34	37	14	14
30.....	33	18	.....	.....	17	18	38	26	68	51	80	60	80	55	61.5	50	55	40	58	29	42	24.5	14	14
31.....	41	.....	.....	.....	21	21	44	27	64	42	70	56	73	52	71	49	55	41	56.5	45	.....	53	27	27

APPENDIX -- (Continued).

1884.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1.....	28	22	49	18	4	-4	23	58	39	70.5	44	87	63	76	50.5	71.25	53	70.78	58	48.75	40.5	36	21.5
2.....	28	15	30	.....	18	6	.....	31	80	54	80.25	57	87.5	65	75.75	53	72	52	72	48.5	52	31.8	21
3.....	33.5	16	36	19	19	6	.....	29	74	38	80.5	54	82.25	60	82	60	83	52	84	48	42	37	20.74
4.....	33	5	26	14	20	3	35	28	63	40	79	57	81.5	58	87	66.8	92	64.8	70.75	52	47	30	26	
5.....	33	8.5	37	14	14	4	39	29	58	48	81.25	55	87.5	63.25	87.75	63	94	67	84.25	57.75	54	30	31	
6.....	11.5	4.5	52	32	30	10	31	27	72	49	84.75	59	80.5	59	74.5	62.5	88	61	70.5	52	36	48.5	39	
7.....	14	4.5	55	28	24.5	17	34.5	28	62	50	85.5	63	71.5	55	74.5	56	92	66	75.5	51.5	34	54	40.5	
8.....	19	2	29	15	23	18	43.5	25	50	45	82.5	60	72.5	54	79	57	91.5	67.25	63.25	47.25	51	52	37	
9.....	28	11	37	21	30	20	52.5	31	55	45	89.5	63.5	72.5	53.5	79	48	88.75	64.5	66	38.75	52	52	32	
10.....	28	15	39	22	31	18	38	34	65	45	85	49	71.5	58	73	48	87.5	65	51	37.75	37	41	24	
11.....	36	16	29	20	31	16	41	35	56	43	60	53	78.5	50.5	77.7	54.25	93	67	63.75	37.75	36	37	28	
12.....	35	12	35	24	48	27	42	31	54	41	64.5	58	81.75	59	80.5	56	84.5	52.5	76.5	49.5	45	40	29	
13.....	22	11	45	21	46	31	50	30	60	39	72.5	51	72	58	80.5	58	65.25	49	71.5	48.5	32	30	22	
14.....	42	16	49	34	51	33	53	29	59	44	62.5	45	70.5	51	83	55	58.5	36	62	37.5	48.75	27	23	
15.....	30	4	37	12	34	26	64	22	59	41	66.5	41	67.75	50.5	.....	.....	62.5	42.75	46.5	27.75	33	27	24
16.....	12	-2	20	11	35	19	54	.....	58	40	72.5	50	68	53	.....	.....	76.25	50.5	54	28.75	34.75	20	26.5
17.....	20	-1	37	15	37	21	57	37	54	40	80.25	51.5	65.5	56	.....	.....	83.5	59	63	55	30	30	18
18.....	34	18	40	34	48	25	40	36	60	42.5	84	56	69	56	.....	.....	78	51.5	55.5	38	20.5	5	5
19.....	36	16	40	32	38	27	47	37	68	50.5	87.25	63	77.5	58	94.5	67	58	40.5	47.25	25	10.5	10.5	-5	
20.....	12	5	47	.....	36	32	50	37	.....	55	84.25	61	76	51	95	67	67.75	42.75	58	29	15.5	0	-15.5
21.....	14	1	23	15	36	31	48.5	30	61.5	47	86.5	59	70	51	92	69	64	48	76	48.5	28	19.5	13.5	
22.....	19	2	40	15	46	31	42	27	79	49	89	65	72	57	93	69	65	48	77.25	46	32	37	19	
23.....	31	17	44	16	52	33	49	30	80	56	88	59	79.5	59	92	69	70	51.75	62.25	50.5	32.75	42	14	
24.....	40	8	24	10	51	38	57	33	88	62	88.75	59	84	61.5	82	56	70	51	62.25	59	26.75	20	9.5	
25.....	10	2	29	11	45	36	63	39.5	75	57	90.5	59	81	60.5	65.5	54	78	52	45	28	19	26	11	
26.....	9	-13	38	28	45	37	62	42	65	49	59	49	70	58.5	72	44	64.5	58	42	31	31.5	14	25	
27.....	20	0	41	28	54	37	62	36	74.5	51	69	48	80.75	58	79.5	54.5	68.5	45	45.75	27	17.5	11.75	-3	
28.....	24	13	35	28	47	34	74	48	65	37.5	78.5	53	73	58	75.5	54.5	68.75	47	54	33	20.5	37.75	2	
29.....	28	21	31	28	50	31	62	32	49	33	81.75	55	72.75	61.5	82.5	65	78.75	58.25	50.25	45	24	40	36	
30.....	34	22	.....	.....	54	16	43	34	53	37	83.75	58	74.5	58	80	64	76	64	45.75	23.5	27.5	46.5	38
31.....	49	.....	.....	.....	54	17	43	34	53	37	.....	.....	83.5	64	80.5	56.5	.....	.....	49	.....	.....	55.5	43

* Thermometer broken. Exceedingly hot.

APPENDIX -- (Continued).
Readings of soil thermometers.

April--1883.	1 inch deep.			8 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.	
		6 P. M.			6 P. M.			6 P. M.			6 P. M.			6 P. M.			6 P. M.	
12.....	...	45.5	43	...	45.5	44.5	...	44	43.5	...	46	45	...	46	45	.....	45	43
13.....	38	57.5	55	...	49	54	40	43.5	50	42	43	48.5	43	42 75	42.5	43	42.5	43
14.....	45	57	59.5	43	51	56.5	44	47	52	45.5	40.5	50	45.5	45.5	43	43	43	43
15.....	50.5	66	64	47	57	61	46.5	50.5	55.5	48	49.5	53	47.5	48	44.5	44	44.5	44.5
16.....	49.5	53	62	50	52	51	50.5	50	50	57.5	50.5	51	51.5	50	46	45.5	46	46
17. . .	43	55.5	58.5	42	50	57	44.5	46.5	52.5	47	47	51	47.5	47	46	46	46	46
18.....	43	62	59	41	54	59	44	48	54.5	47	47.5	52.25	47.5	47	46	46	46	46
19. . .	44.5	54	50	44.5	48	50	46.5	46.5	49	49	48	49.5	49	48	46.5	46.5	46.5	46.5
20. . .	39.5	58	52	40	51.5	51.5	42.5	46.5	49.5	45.5	46	49	46	46	46	46	46	46
21. . .	39	53	53.5	38	48	53.5	41	44	50	44	44.5	49	45.5	44.5	45.5	45.5	45.5	45.5
22. . .	42	..	46	40	..	47	42	..	47	45	..	47	45.5	..	..	..	..	..
23. . .	35	48	43.5	36	45	44	39.5	42	44	43	43	45	44	43.5	45	45	45	45
24. . .	34.5	43.5	41	34	41.5	41	38.5	39.5	41.5	41	41	42.5	42.5	41.5	44	44	44	44
25.....	32	39	40.5	32	37	39	36	36.5	38.5	39.5	39	40	40.5	40	43.5	43.5	43	43
26.....	35.5	45	46	34	40	43	36	38	41	39	39	41.5	39.5	39.5	42.5	42	42	42
27.....	39	49.5	49	37	45	47	38.5	41	44	41	41.5	43	41.5	41.5	42.5	42.5	42.5	42.5
28. . .	39	41.5	43.5	38	40	41	39.5	40	40.5	42	41.5	42	42.5	42	43	43	43	43
29.....	39.5	55.5	48	37	48.5	48	36	42.5	45.5	39	42	44.5	40	41	42.5	42.5	42.5	42
30.....	35.5	.....	54	34	.....	51	37.5	.....	47.5	41	.....	46	41.5	....	44.5	42.5	42.5	43

APPENDIX—(Continued).

May—1883.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.	39	56.5	53.5	37.5	50	52	40	44	48.5	43	44	48	43.5	43.5	46	43.5	43.5	45.5
2.	42	59	60	40.5	52	57	42.5	45	53	45	45.5	51	45	44.5	48.5	44	44.5	44.5
3.	51	59.5	53.5	49.5	54.5	54	49.5	50	52.5	50	50.5	52	49.5	46.5	50.5	45.5	46.5	46
4.	44	55	61	43	49	59.5	46	46.5	53	48	47.5	51.5	47.5	46.5	49.5	46.5	46.5	46.5
5.	51.5	54	54.5	51	53	52	50	50	51.5	51	51	51.5	50.5	47	50.5	47	47	47.5
6.	53.5	59.5	58.5	49.5	57	58	47	48	55	48.5	50.5	54	49.5	47.5	52	47.5	48	48
7.	46	51	54	46	49.5	52.5	47.5	50	49.5	50	49	50	50	48	49.5	48	48	48
8.	49	59.5	58.5	49	55.5	58	49	50	54.5	50	50	53.5	50	48	52	48	48	48
9.	47.5	53.5	53	48	51.5	53	49	49	51.5	51	50	51.5	51	48.5	51	48.5	49	49
10.	50	68	66	48.5	62	65	48	52	59.5	50	51	57	50	49	54	49	49	49
11.	50	60.5	56	51	57	57	54	54	56	54.5	54	56	55	50	55	50	50.5	50.5
12.	44	55	54	44	51.5	54.5	46.5	48	52	50	49.5	52	51	50.5	51.5	50.5	50	50
13.	48.5	...	49	45	...	50	44.5	...	50	47.5	...	51	48.5	...	50	...	...	49
14.	41	50	46	40.5	48	45	43	45	45.5	46.5	46.5	47	48.5	47	47	48.5	48.5	48
15.	47	49.5	55	46	48	53.5	45	46	49	47	47	49	47	48	48	48	47.5	47.5
16.	43	59.5	54	42	54.5	54	44	53	51	47	47.5	51	47.5	47.5	49.5	47.5	48	48
17.	44	64.5	61	42	58	60.5	44	49	55	47	48	53	48	48	51	48	48	48
18.	46.5	60.5	63	46.5	56	61.5	48	50	56	50.5	50.5	54	51	49	52.5	49	49	49
19.	53	...	64	52.5	...	63	52	...	57.5	53	...	56	53	...	54.5	50	...	50
20.	57	65	66	56	63.5	64.5	55	57.5	60	55.5	56.5	58.5	55	51	57	51	51	51
21.	49	47	47	51	48.5	47.5	54.5	54	49.5	56	54	52	56.5	52	52.5	52	52	52
22.	45	49.5	46	45	48.5	46.5	46	47	47.5	49	49	49	50	51	49	51	50	50
23.	43.5	48	49.5	44	47	48	44.5	45	47.5	47	47	48.5	48	49.5	48	49	49	49
24.	50	67	60.5	47	61.5	60	46.5	51	56	48	50	55	48	49	53	49	49	49
25.	52	73	70.5	50	66.5	69	50	55.5	61.5	52	53.5	58.5	52	50	56	50	50.5	50.5
26.	60	...	65.5	57	...	65.5	56	...	63	57	...	61.5	56.5	...	59.5	51.5	...	52.5
27.	64	73	65.5	59	68	63.5	56	60	68	57	58	66.5	57	53	59.5	53	53.5	53.5
28.	56	66.5	63	55	64.5	62.5	56	58	60.5	58	58	60	58	54	59	54	54	54
29.	55	62	61	54.5	59	61	55.5	55	59	57	56.5	59	57	54.5	58	54	54	54
30.	51	67	56	49.5	62.5	56.5	51	55	57	54	55	57	55	54	56.5	54	54	54
31.	54	65	62.5	44	62	62	54	56	59	55.5	56	58.5	55.5	54	57	54	54	54

APPENDIX -- (Continued).

June--1883.	1 inch deep.			8 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.....	53	69.5	66.5	51	65	66	51.5	56	62	55	55.5	60	55.5	55	58	54	54	54
2.....	62	69.5	68	51	65.5	67	53	57	62.5	56	56.5	60.5	57.5	56	59	54.5	54.5	54.5
3.....	62	70.5	68	58	67.5	66	55	59.5	62.5	58	58	66	60.5	57.5	60	55	55	55
4.....	62	81	73	61.5	74.5	72	60	64	68.5	62	62	67	62	62	64	56	56	56
5.....	62	82	78	59.5	75.5	76.5	60	64.5	70	63	63	67	62	57.5	57.5	57.5	57.5	57.5
6.....	67	.....	78.5	66	.....	77	65	.....	72.5	65.5	.....	70	65	58.5	58.5	58.5	58.5	59
7.....	67.5	75	68	66.5	72	67.5	65.5	67	66.5	67	66.5	67	66	60	60	60	60	60
8.....	62.5	80.5	75.5	60	74.5	75	60.5	64.5	70	62.5	63.5	68	63	60	60	60	60	60
9.....	60.5	75.5	73	60	70.5	71.5	61.5	63.5	68	64	63.5	67	64	60	60	60	60	60
10.....	69.5	84.5	73.5	67.5	80	73.5	65	70.5	72	65.5	68	70	64.75	60	60	60	60	60
11.....	69	76	68	67.5	72	68	66	67.5	68	67	66.5	68	66.5	61.25	61.25	61.25	61.25	61.5
12.....	60.5	75.5	78.5	66	70.5	76.5	61	64	70	63	63.5	68	63.5	61	61	61	61	61
13.....	66.5	74	.....	66	71	.....	66	66.5	.....	65.5	66	.....	66.5	61.5	.....	61.5	61.5	.....
14.....	58	77	70.5	55	71.5	70.5	58	62	67.5	61	61.5	66	62	61.5	64.5	61	61	60.5
15.....	58	74	72	58	69.5	71	59	61.5	67	62	62	65.5	62.5	61	64.5	61	61	60.5
16.....	61	68	.....	60	65.5	.....	60.5	62.5	.....	63	63	.....	63	61	61	61	61	.....
17.....	67	75.5	72	65	73	71	62	65	69	62.5	62.5	67.5	62.5	63	66.5	61	61	61
18.....	67	70	72	66	68	71.5	66	65.5	68	66	64	67.5	66.5	63.5	66.5	61.5	61.5	61.5
19.....	66	79	72	65	75	71.5	65	68	69.5	66	66	69	66.5	62	62	62	62	62
20.....	61	67	66	61	65	65	62	62	64.5	64.5	64.5	64.5	64.5	62	62	62	62	62
21.....	61	67.5	67	60	65	66	60	62	64.5	62	62	63.5	62	61	61	61	61	61
22.....	64.5	79.5	76	60	74	75	59.5	64.5	70	61	63	67.5	61.5	62	60.5	60.5	60.5	60.5
23.....	65	86	81	62	79	80	62.5	77.5	74	64.5	66	71	64.5	62	62	62	62	62
24.....	74	84	78.5	69.5	79.5	78	65.5	70	73.5	68	68	71.5	67	65	69	63	63	63.5
25.....	67.5	74	74	66	73	73	67	69	71	68.5	68.5	70	68	64	70	64	64	64
26.....	65.5	71	70	65.5	68.5	69	66	66	67.5	67.5	67	67.5	67.5	64	67	64	64	64
27.....	66	67.5	69.5	65	67	68.5	65	65.5	66.5	66	66	67	66	63.5	66.5	63.5	63.5	63.5
28.....	67	76.5	73.5	65	74.5	73	64.5	67	70.5	65.5	65.5	69.5	65.5	63.5	68	63.5	63.5	63.5
29.....	66	82	78	65	76.5	77.5	64.5	68.5	73	66.5	66.5	71	66.5	64	69.5	64	64	64
30.....	63	79.5	71	63.5	74.5	72	66	67.5	71	68	67.5	70	68	64.5	69	64.5	64.5	64.5

APPENDIX — (Continued).

July—1883.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
	65.5	82	74	61.5	76.5	73	60.5	66.5	70	63.5	65.5	69	64.5	65	68	64.5	64.5	64.5
1.....	68	83.5	70	65.5	79.5	69.5	64.5	69.5	69	66.5	68	69.5	66.5	67	68.5	64.5	64.5	64.5
2.....	65.5	73.5	76	63.5	71.5	74	64	67.5	70	66	67.5	69	66.5	67	68	64.5	64.5	64.5
3.....	73	85	77.5	69.5	80	76.5	67.5	71.5	74	68	69.5	72.5	68	68.5	71	65	65	70
4.....	72.5	88	81.5	69	81.5	81	68.5	71.5	76	70	71	74	70	70	72	65.5	65.5	65.5
5.....	75.5	89.5	84.5	72	84.5	83	70.5	74	78	71.5	72.5	76	71.5	71.5	74	66	67	67
6.....	73	87	.....	71.5	82	.....	71	74	.....	73	73.5	.....	72.5	72.5	..	67.5	68	.....
7.....	63.5	65	66	64	65	66	66	66	66	69	68	68	70	68.5	68	67.5	67.5	67.5
8.....	61.5	82.5	77.5	58	76	76.5	60.5	65.5	72	64	68	70	65	65	68.5	66	65.5	65.5
9.....	60.5	81.5	77	59	76	77	62	66.5	73	65.5	66	71	66.5	66	69.5	66	65.5	65.5
10.....	69.5	80.5	78	66.5	77.5	77	66.5	70.5	74	68.5	69.5	72.5	68.5	68.5	71	66	66	66
11.....	68.5	84	83	67	79.5	81.5	67.5	71	76.5	69.5	70	74.5	69.5	69.5	72.5	66.5	66.5	67
12.....	69	76	75.5	68	74	75	64	66.5	73	71	67	71	71	67.5	70	67	67	67
13.....	62.5	80	70.5	62.5	70.5	69.5	66.5	67.5	68.5	67.5	68	69	67.5	68	69	66.5	66.5	66.5
14.....	71	73	70.5	66	70.5	77	66	70	75	67.5	69	73.5	67.5	68	71.5	66.5	66.5	66.5
15.....	67.5	85	77	67	79.5	72.5	67.5	69.5	73	70	70	72.5	70	70	71.5	67	67	67
16.....	69.5	80	72	62.5	75	69	64.5	67.5	68.5	67.5	68	69	68.5	68	71.5	67	67	67
17.....	65	73	70	62.5	70.5	69	61.5	65.5	69	65	65.5	68.5	66	65.5	68.5	66.5	66	66
18.....	61	77	72.5	59	72	71.5	61	66	71	64.5	67	72	67	67	69	66	66	66
19.....	61.5	79.5	75	59	75.5	74.5	61	67	69.5	67	69.5	70	65.5	65.5	68.5	66	66	66
20.....	64	76	76	63	73	73.5	64.5	67	73.5	68	69.5	71	67	67	71	66	66	66
21.....	71	87	78	69	78	77	67	71	73.5	68	69.5	72	68	68.5	71	66	66	66
22.....	70	73	73.5	69	71.5	72.5	69	70	70.5	70.5	70	71	70	70	70	67	67	67
23.....	65.5	71	70	63	69.5	70.5	64.5	66.5	69	67	67.5	69	67.5	67	68	66.5	66.5	66.5
24.....	61.5	.....	.....	59	.....	.....	61	.....	73	64.5	.....	71	65.5	.....	69.5	.....	.....	.....
25.....	63	85	77	60.5	79	79.5	63	68.5	75	66	67.5	73	67	67	71	66.5	66.5	66.5
26.....	65	79	79.5	65	74.5	78	66.5	68.5	73.5	69	68.5	72	69.5	68.5	71	67	67	67
27.....	67	81.5	76.5	66.5	76.5	75.5	67	69.5	73	69	69.5	72	69.5	69	71	67.5	67.5	67
28.....	70	73	68.5	65.5	70	69.5	64	66.5	69	66.5	67	69	67.5	67	68.5	67	67	67
29.....	59	76.5	69	57.5	71	69.5	60	64	68.5	64.5	64.5	68	65	64.5	67	66.5	66.5	66
30.....	60	70	73.5	60	68	72.5	61.5	64	69.5	64.5	64.5	68.5	65.5	65	67.5	66	65.5	65.5
31.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

APPENDIX -- (Continued).

	6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.....	64.5	66	71.5	65.5	66.5	70	66.5	67.5	69	65.5	66.5	65.5
2.....	64	66.5	71.5	66.5	67.5	71.5	67	67.5	69.5	66	66.5	66
3.....	66	66.5	67.5	67	67.5	68	67.5	67.5	68	66	66	66
4.....	57.5	61	65	63	63	65.5	64	63.5	65	65.5	65.5	65.5
5.....	60	60	67	63	63	66.5	63	63	66	65	65	64.5
6.....	60.5	64.5	71	63	64	69	64	64	67.5	65	64.5	64.5
7.....	58.5	65.5	72	63.5	65	70	64	65	68.5	65	65	65.5
8.....	59	66.5	73	65.5	66	71	65.5	66	69.5	65.5	65.5	65.5
9.....	60.5	67.5	74	66	67	72.5	67	68	70.5	66	66.5	66.5
10.....	64	68.5	74	68.5	68.5	72.5	68.5	69	71	66.5	66.5	66.5
11.....	65	69.5	74	69	69	74.5	69	69	71	67	67	67.5
12.....	71.5	69.5	76.5	69	69	74.5	70	70	73	67.5	68	67.5
13.....	67.5	69.5	70.5	71	70.5	71.5	71	70.5	70.5	68	67.5	68
14.....	68	67.5	73	67	67.5	71.5	67.5	67.5	70	67	67.5	67.5
15.....	57	63	72	63.5	63.5	70.5	67	66	69	67	67	66.5
16.....	61.5	68	71.5	66.5	66.5	70.5	67	67	69.5	67	66.5	66.5
17.....	61.5	69	73.5	66	66	72	67	67	70	66.5	66.5	66.5
18.....	66	69	73.5	66.5	66.5	72	69	69	70.5	67	67	67.5
19.....	70	69	74.5	66.5	66.5	72	69	69	70.5	67.5	67.5	67.5
20.....	68	69	74.5	66.5	66.5	72	69	69	70.5	67.5	67.5	67.5
21.....	64	69	75.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
22.....	64	69	75.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
23.....	73	69	75.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
24.....	61	69	75.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
25.....	60	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
26.....	66	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
27.....	58	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
28.....	58	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
29.....	57.5	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
30.....	50.5	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5
31.....	54.5	69	74.5	68.5	68.5	73.5	69	69	71.5	67.5	67.5	67.5

August-
1883.

APPENDIX — (Continued).

September — 1882.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.....	76	75	57.5	72	74.5	60	60	64	70	63.5	64	68	64	63.5	66.5	64	64	64.5
2.....	70	66	62	68	65	62.5	62.5	64	64.5	64.5	64.5	65.5	65	64.5	65.5	64.5	64.5	64.5
3.....	65	67	57	62.5	66	60	60	60	63	63	62	63	63	63	62	63	63	63
4.....	69	64	49.5	64	65	54.5	54.5	57.5	64	60.5	58.5	63.5	61.5	59.5	63	63.5	63.5	62.5
5.....	70.5	66.5	50	65.5	66.5	54	54	58	64.5	58	58.5	63.5	60	59	62.5	62.5	62.5	62
6.....	69	65	53	64.5	64	56	56	64	62	59.5	59.5	62.5	60.5	60	62	62	62	62
7.....	58.5	55	59	59	56.5	50.5	50.5	59.5	57.5	55	55	59.5	56.5	56.5	59.5	61.5	62	60.5
8.....	66	60	46	61	61.5	51	51	35	57.5	55	56	59.5	56.5	56.5	58.5	61	61	59.5
9.....	65	65	47.5	61	65	50.5	50.5	.....	60.5	54.5	54.5	60.5	53.5	53.5	59.5	60	60	59.5
10.....	.....	.....	49	.....	.....	53	53	.....	61.5	56.5	56.5	60.5	58	58	59.5	60	60	59.5
11.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14.....	76	73	63	72.5	73	61	61	64.5	70	63.5	63.5	67.5	63	63	66	60	60	62.5
15.....	63	71.5	63	63	71	64	64	68.5	68	65.5	65.5	67	63.5	64.5	65.5	63	63	62.5
16.....	71	64	52	66	64	56	56	59	64.5	59.5	60	64	61	60.5	64	62.5	62.5	62
17.....	.....	65	52.5	.....	65	55	55	59.5	62.5	60	60	62.5	60	60.5	62.5	61.5	61.5	61.5
18.....	74	67.5	55.5	66.5	67	57.5	57.5	59.5	64	61.5	61.5	63.5	61	61.5	64	61.5	61.5	61.5
19.....	70	68.5	57.5	66.5	68.5	59	59	65	66	62	61.5	65	62	61.5	62	62.5	62	62
20.....	75	64	57	69	64.5	58.5	58.5	61.5	63.5	60	60	63.5	62	62	64	62.5	62.5	62
21.....	.....	61.5	57.5	.....	61	56.5	56.5	59	60	61	61	61.5	61.5	61.5	61.5	62.5	62.5	62
22.....	60.5	61.5	57.5	60	61	56.5	56.5	59	60	61	61	61.5	61.5	61.5	61.5	62.5	62.5	62
23.....	54	51.5	54	54.5	52.5	55	55	55.5	54.5	58	58	57	59	58.5	58	61	61	60.5
24.....	63.5	55	44.5	58.5	56	49	49	57	56	53.5	53.5	56.5	55	54.5	56.5	60	60	59
25.....	62.5	57	40	57.5	57	49	49	51.5	56	53.5	53.5	56.5	54.5	54	56.5	59	59	58.5
26.....	62.5	54	53	59	55.5	54	54	54.5	56.5	56	56	57.5	56.5	56.5	57.5	58	58	58.5
27.....	57	53	48	53	53	51	51	50.5	53	53	53	54	55	54.5	55	57	57	56
28.....	53	53	51	53	51	51	51	51.5	53	54	54	54	54	54	54.5	57	57	56
29.....	57	53	50	53	51	51	51	51.5	53	54	54	54	54	54	54.5	57	57	56
30.....	53	50	50	53	51	51	51	51.5	53	54	54	54	54	54	54.5	57	57	56

APPENDIX -- (Continued).

April--1884.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.....	33	49	44	34	40.5	44	33.5	35.5	41	35.5	36	40	36	36.5	39	38	38	38
2.....	36	37.5	34.5	36.5	37.5	35.5	36	35.5	35.5	38	38	37.5	38.5	38	38	38.5	38.5	38.5
3.....	33.5	34.5	35	34	34	35	34	34	34.5	36	36	36	36.5	36.5	36.5	38.5	38.5	38.5
4.....	33.5	40	36.5	33.5	38	37	33.5	35.5	36	35.5	36	37	36	36.5	37	38	38	38
5.....	33	33.5	33.5	33	33.5	33.5	33.5	35	34	36	36	35.5	36.5	36	36	38	38	38
6.....	32.5	35	35	33	33.5	35	33	35	34	35	35	35.5	35.5	36	36	38	38	38
7.....	33	45	43.5	33.5	39.5	43	33	35	40	35	35.5	39	35.5	36	38	37.5	37.5	37.5
8.....	33	47	47.5	33	41	46	34	36	42	36.5	37.5	40.5	37	37	39	38	38	38
9.....	39	40	38.5	33	39.5	39	38.5	38.5	38	40	39.5	39.5	40	38.5	39.5	39	39	39
10.....	35	44.5	42.5	35	41	42	35	37.5	40	37.5	38.5	40	38.5	39	40	39	39.5	39.5
11.....	37	41	41.5	37.5	39.5	41.5	37	39	40	39	39	40	39	39	41	39	39.5	39.5
12.....	35	54	48.5	35	46	48	35.5	39.5	48.5	38	39.5	43	39	39	41	40	40	40
13.....	41.5	61	51	38	52	51	37	43.5	47.5	39.5	43.5	45.5	40	41	43.5	40	40	40
14.....	36.5	56	55	87.5	48	53	38	42	48.5	41	42	46	41.5	41.5	44.5	41	41	41
15.....	43	45	49.5	43	43.5	47	42.5	42	45	44	43.5	44.5	44	43.5	44	42	42	42
16.....	47	52	47.5	46	49.5	48	49	46	46.5	45	45.5	46.5	44.5	45	45.5	42	42.5	42.5
17.....	39	42	42	40	42	42	40.5	40.5	41	43	42.5	42.5	43.5	43	43	43	42.5	42.5
18.....	39	45	47	39	43	46	39	40	43	41	41.5	43	42	41.5	42.5	42	42	42
19.....	43.5	50	48.5	43	47	48	42	44	45.5	43	44	45.5	43	43.5	44.5	42	42.5	42.5
20.....	43	47.5	47.5	42.5	46	46.5	41	44	44.5	43	43.5	44.5	43.5	43.5	44	43	43	43
21.....	37	46	46.5	39	43	46.5	40	40.5	44.5	42.5	42	44.5	43	42.5	44	43	43	43
22.....	34	53.5	52	35.5	47	51	37	40.5	42.5	40.5	41	45.5	41.5	41	43	43	42.5	42.5
23.....	39	55	58	38.5	49	56	39.5	43.5	51.5	42.5	43	49	43	43	44	44	44	44
24.....	41	58.5	61.5	41.5	51.5	56.5	42	45.5	52.5	45	45	50	45	45	45	45	45.5	45.5
25.....	47	59	64	46.5	54	60	46.5	48.5	55.5	48	48	53	47.5	47.5	50	46	46.5	46.5
26.....	47	62.5	61.5	48	56.5	62.5	47	50.5	62	49	49.5	54	49	48	51.5	46	46	46
27.....	51	68	61.5	48	60	60	47	52.5	57	49	49.5	55	52	50	52.5	47	47	47
28.....	53.5	62	61	52	58	60.5	51.5	53.5	57.5	52.5	53	55.5	50	48.5	53.5	47.5	48	48
29.....	42.5	47.5	50.5	44	46	49.5	46	45.5	48	49.5	48	48.5	50	48.5	48.5	48.5	48.5	48
30.....	43.5	57	60	42.5	52	58	43	47	54	46	46.5	51.5	46.5	46.5	50	47.5	47	47

APPENDIX -- (Continued).

May-1884.	1 inch deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.		7 P. M.	7 A. M.		7 P. M.	7 A. M.		7 P. M.	7 A. M.		7 P. M.	7 A. M.		7 P. M.
	Noon.	6 1		Noon.	6 P. M.		Noon.	6 P. M.		Noon.	6 P. M.		Noon.	6 P. M.	
1	64.5	65	63	48.5	58.5	58.5	51	55.5	55.5	50	53	53	47.5	47.5	48
2	58.5	59.5	60	55	58.5	58.5	56	57.5	57.5	54	53.5	53.5	48.5	48.5	49.5
3	45	60.5	60	47	57	57	50.5	55	55	51.5	53.5	53.5	49.5	49.5	49.5
4	51	55	64.5	49.5	54	54	51	53	53	51	51.5	51.5	49.5	49.5	49.5
5	50.5	65.5	64	49.5	54	54	51	53	53	51	51.5	51.5	49.5	49.5	49.5
6	55	60	59	53.5	58	58	54.5	55.5	55.5	54	54.5	54.5	50	50	50.5
7	51.5	50	51	52.5	50.5	50.5	53	53	53	53.5	53.5	53.5	50.5	50.5	50.5
8	47.5	53.5	53	48	51.5	51.5	50.5	52	52	50.5	51.5	51.5	50	50	50.5
9	51.5	56.5	53.5	50	54	54	51	53	53	51	51.5	51.5	49.5	49.5	49.5
10	48	54.5	53.5	49	51	51	50.5	51.5	51.5	49.5	50.5	50.5	49.5	49.5	49.5
11	48	50.5	50.5	47	50	50	49	51	51	48.5	48.5	48.5	49.5	49.5	49.5
12	46	57	56.5	44.5	53.5	53.5	47.5	52.5	52.5	48.5	48.5	48.5	49.5	49.5	49.5
13	46.5	54	53	40.5	51	51	49	50.5	50.5	50	50.5	50.5	49.5	49.5	49.5
14	48	53.5	53.5	49	53	53	51	52	52	51	51.5	51.5	49.5	49.5	49.5
15	41.5	55.5	53.5	46.5	50.5	50.5	48.5	51.5	51.5	49	49.5	49.5	49.5	49.5	49.5
16	43	57	54	45	53.5	53.5	48.5	52.5	52.5	48.5	48.5	48.5	49.5	49.5	49.5
17	46.5	59.5	57.5	45	55	55	49	54	54	48	48.5	48.5	49.5	49.5	49.5
18	51	60.5	57	48	58	58	51	57	57	50	53	53	49	49	49.5
19	53	62.5	61.5	47	60	60	53	59	59	53	53.5	53.5	50.5	50.5	50.5
20	50.5	60.5	56	51	58.5	58.5	55	55	55	53	54.5	54.5	51.5	51.5	51.5
21	53	74	70.5	51	64.5	64.5	53	60.5	60.5	53	53.5	53.5	51.5	51.5	51.5
22	57.5	75.5	70.5	56	68	68	57.5	61.5	61.5	57	57.5	57.5	54.5	54.5	54.5
23	64.5	73.5	73.5	60	68	68	62	65	65	60	60	60	54	54	54.5
24	66	74	73	61.5	73	73	62	66	66	61.5	61.5	61.5	55.5	55.5	55.5
25	62.5	68.5	68.5	60.5	67.5	67.5	62	64	64	61.5	61.5	61.5	56.5	56.5	56.5
26	60	77	75.5	57.5	69.5	69.5	59.5	66	66	59.5	61.5	61.5	56.5	56.5	56.5
27	62	69.5	68.5	60	65.5	65.5	62	66	66	61.5	61.5	61.5	57.5	57.5	57.5
28	47.5	61	61.5	51.5	59.5	59.5	56	59	59	57	58	58	56.5	56.5	56.5
29	45	60.5	58.5	48.5	50.5	50.5	53	56	56	54.5	53.5	53.5	55.5	55.5	55.5
30	44.5	57	57.5	47	45	45	51	51.5	51.5	53.5	53.5	53.5	54.5	54.5	54.5
31	47	55.5	56	47.5	46.5	46.5	51	52	52	53.5	53.5	53.5	53.5	53.5	53.5

APPENDIX — (Continued).

	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	T A. M.	Noon.	6 P. M.	T A. M.	Noon.	6 P. M.	T A. M.	Noon.	6 P. M.	T A. M.	Noon.	6 P. M.	T A. M.	Noon.	6 P. M.	T A. M.	Noon.	6 P. M.
June-1884.																		
1	78.25	74	71.75	55	70.5	71.75	54.5	62	66.5	63	56	60.5	56	57	60.5	54	54.5	54.5
2	80.5	77.75	76	59.25	72.25	76	58.75	64	71	67	59.75	64	59	60	64	55.5	56	56
3	84.75	77.5	73.25	60.25	73.25	77.5	60.25	66.5	72	68.5	62	68.5	62	62	65.5	57	57.5	57.5
4	84	79.75	78.5	62	76.25	78.5	62	67.75	73.75	70.25	63.5	70.25	63.5	63.5	67	58	58.5	58.5
5	86.5	80.75	79	62.5	76	79	63	68	74	71.5	66	71.5	66	66	69.75	59.5	59.5	59.5
6	87.5	81	79.5	65	78	79.5	64.75	70	75	71.5	67.5	71.5	67	67	69	60.25	60.5	60.5
7	87.5	80.75	78.5	66.75	79.5	78.5	65.25	71.5	73.5	70.5	67.75	73.5	67	68	69.5	61.5	61.5	61.5
8	86	72.25	74	67.5	79.5	74	67.25	72.25	73.5	73.5	68	73.5	68	68.25	70.5	62.25	62.5	62.5
9	62	63	62.75	60.5	61.5	62.75	62	61.5	62	63.5	65.5	63.5	64	64	63.5	62.5	62.5	62.5
10	63.5	65	63.75	62	62.5	63.75	61	61	62	62.5	62	62.5	62	62	62.25	61	61	60.5
11	71.25	72.5	70.5	62	67.25	70.5	61	63	71.75	65	62	64.75	62	62	64.75	60.5	60.5	60.25
12	77.25	69.25	70.5	59.25	71	70.5	60	64.75	68.5	67	62	65	62	62.5	65	60.25	60.5	60.25
13	68.5	68	67.5	56.5	64.5	67.5	57.5	61	65.5	64.5	61.5	66.5	61.5	61.25	63	60.5	60.5	60.25
14	79	72	72	56	71.5	72	56.5	63.5	69	66.5	60.5	66.5	62	62.5	64.5	60	60	60
15	84	79	78	57.5	74.5	78	58.5	65.75	73	69.5	62	69.5	62	65	66.75	60.5	60.5	60.5
16	89.25	83.5	82.25	61.25	79	82.25	62	69.5	77	72.75	64.25	72.75	64.25	65	69.5	61.25	61.5	61.5
17	90	85	83.75	64.75	81	83.75	65.5	72	78.5	72.5	67.5	72.5	67.5	67.5	71.5	62.5	63	63
18	90	83.5	82.25	69	82.25	82.25	68.5	74	78.5	75.5	69.75	75.5	69.75	70.5	73.5	63	64	64
19	96	87	86.25	69.25	85.25	86	69.25	75.75	78	75.5	70.25	75.5	70.25	70.5	74.25	63.75	65	65
20	95.25	88	86.25	68.5	85	86.25	69.25	75.75	81.5	77.75	71.5	77.75	71.5	71.25	74.25	64.75	65	65.75
21	96.5	88.5	87.5	72	87.75	87.5	72	80	83.5	78	73.5	78	73.5	73.5	74.5	65.75	66.5	66.75
22	94	79	78.5	69.75	81.5	78.5	70.5	74.5	76.25	75.5	73.5	75.5	73.5	73.5	76.25	67.25	67.25	67.25
23	94	76.25	76.5	71	85	76.5	70	67.25	75	73.25	71	73.25	71	71	73.5	67	67	67
24	94.5	61.5	63.5	69	66.5	63.5	69	67.25	64.5	69.25	62.5	69.25	62.5	69.5	67	67	66.5	66
25	96	76.25	76.25	58	71.5	76.25	60	64.25	74.25	64.25	64	64.25	64	64	67	65	64	64
26 .....	...	...	...	58.5	...	...	...	...	...	...	...	...	...	...	...	64.25	...	...
27	87.5	81.5	81.5	62.5	70	81.5	63.5	67.75	71.5	71.5	64.5	71.5	64.5	67	69	64.5	64.75	64.75
28	90	84.5	83.5	66	83.25	83.5	66	68.25	77	74	68.75	74	68.75	68.5	71	64.5	65.5	65.5
29	83.5	83.5	83	67	80	83	68	73	79	76	70.5	76	70.5	70	73.25	66.25	66.5	66.5

APPENDIX -- (Continued).

July--1884.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.	Noon.		7 A. M.
	7 A. M.	6 P. M.		7 A. M.	6 P. M.		7 A. M.	6 P. M.		7 A. M.	6 P. M.		7 A. M.	6 P. M.		7 A. M.	6 P. M.	
1.	70.5	87.5	86	70	84	79.5	70	78	79.5	71.5	76	71.5	71.5	74	67	67	76.5	67
2.	74	91	83.5	71.5	83.5	80	71	76.5	80	73.5	78.5	73.5	72.5	75	67.5	67.5	76.5	68
3.	68.5	89	84.5	68	82.75	79	69	74	79	72	76.75	72	71.75	74.25	68	68	68	68
4.	68.75	86	72	68.5	74	74.5	69	79	74.5	72.5	75	72.5	71.5	73.25	68	68	67.5	67.5
5.	69.5	72.5	73.5	67.5	73.5	72	67.5	71	72	71.75	71.75	71.75	70	71	68	67.5	67.5	67.5
6.	64	71.5	63.5	62.5	65	65.5	61	66.75	65.5	66.5	67	66.5	67.5	67.25	67	66.5	66.5	66.25
7.	59.5	65	66	60	65	64	60	62	64	63.5	64.75	63.5	65	65	65.5	65.5	65	65
8.	59.5	69	67.5	59.5	67	65.5	59.5	63.5	65.5	63.5	65.75	63.5	63.5	65	64.5	64.5	64	64
9.	61	77	74.5	59	74.5	71.5	63	69.75	71.5	64	73	64	66	67	64	64	64.5	64.5
10.	63	86	81.5	62.75	80.5	76	65	72	76	67	79.75	67	68.5	70.5	64.25	64.25	64.5	64.5
11.	66.75	86.25	82	64.75	81.5	82.5	65	72	82.5	69.5	82.5	69.5	68.75	72	65.25	65.25	65	65
12.	67.5	70.5	69	66.75	68	67	67	68	67	74	69.25	69	68.25	68.25	66	66	66	66
13.	65.5	77	69	63	69.75	65.75	62.5	68.5	69.25	65	65.75	65	66	68	65.5	65.5	65	65
14.	58	65	68	58.25	67.5	66.5	60	61.5	65.75	63.25	66	63	64.75	65	64	65	64.5	64.5
15.	58	74	69.5	56.5	69	66.5	57.75	63	66.5	56.25	66	62.75	62.75	65	64	64	63.25	63.25
16.	60	70.5	67	59.25	67	66.5	60	63	65	63	65	62.75	63.75	65	63.75	63.5	63.5	63.5
17.	60.25	73	72	61.75	71.5	68.5	60	64	68.5	62.5	67	63.5	63.5	65.5	63.5	63.5	63.5	63.5
18.	63.5	84.5	79.5	65	79	74.5	62	68.5	74.5	64	72.5	66	64.5	69	63.5	63.5	63.5	63.5
19.	66	79	75.5	61	75	72.25	65	68.5	72.25	67	71	67	67	69	64.5	64	64.75	64.75
20.	62.5	76	71.5	61	71	69.25	61.5	66.2	69.25	65	68	66	65.75	67.5	65	65	64.5	64.5
21.	61	76.25	72	60.25	71	68.5	61.5	67	68.5	64.5	68	65.5	65.25	67	64.5	64.5	69.25	69.25
22.	63.25	80	77.5	62.75	76	72	63	67.5	72	66	70	66	65.25	68.25	64.25	64.25	69.25	69.25
23.	66	73.5	75	64.5	73	73.75	64.25	67	72	67	68.5	66.5	66.5	67.5	64.5	64.5	64.5	64.5
24.	67	82.5	76	64.75	75.75	73.25	64	71.25	73.25	68	72	68	68.25	69.75	64.5	65.75	64.75	64.75
25.	68	80.75	77.75	67	78	75	67	70.25	75	69	73	69	68.25	71	65	65.5	65.5	65.5
26.	62	80.5	81.75	61	80	75.5	62.5	70.25	75.5	70	72.5	70	69.75	70.5	66.25	66.25	66.5	66.5
27.	70.25	74.25	68	64	68.5	68.75	63.5	67.75	68.75	69	70.5	67	69.75	69.5	66	66	65.5	65.5
28.	65	77.5	74.5	64	74	71.5	63.5	69.25	71.5	66	70.5	67	66.5	69	66	66	65.75	65.75
29.	68	77.25	72.5	67	72	76	66.5	69.25	70.25	67	70.25	68	68	69.25	65.75	66	65.75	65.75
30.	65.5	83.5	81	64.25	80.25	76	64.75	70.75	76	67	73.5	68.5	67.5	71	66	66	66	66
31.	68	73.5	70	68	70.5	69.5	68	68.5	69.5	70	70	69.5	70	69.25	66.5	66.5	66.5	66.5

APPENDIX — (Continued).

June—1884.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.....	56	78.25	74	55	70.5	71.75	54.5	62	66.5	56	58.5	63	56	57	60.5	54	54.5	54.5
2.....	60	80.5	77.75	59.25	72.25	76	58.75	64	71	60	61.5	67	59.75	60	64	55.5	56	56.
3.....	62	84.75	77.5	60.25	75.25	77	60.25	66.5	72	62	63.5	68.5	62	62	65.5	57	57.5	57.5
4.....	63	84.5	79.75	62	76.25	78.5	62	67.75	73.75	63.5	64.75	70	63.5	63.5	67	58	58.5	58.5
5.....	63.25	84	80.75	62.5	76	79	63	68	74	65	65.75	70.75	64.75	64.5	67.75	59.5	59.5	59.5
6.....	66.5	86.5	81	65	78	79.5	64.75	70	75	66.25	67.25	72	66	66	69	60.25	60.5	60.5
7.....	68.75	87.5	81.75	67.25	79.5	80.5	66.5	71.5	73.5	67.5	68.5	71.5	67	67	69.5	61	61	61.5
8.....	70.25	87.5	80.75	66.75	81.75	80	65.25	73.75	76.25	68	70	73.5	68.75	68	70.5	61.75	61.75	62
9.....	68.75	86	72.25	67.5	79.5	74	67.25	72.5	73.5	68.5	69.75	72.5	68	68.25	70.5	62.25	62.5	62.5
10.....	59	62	63	60.5	61.5	62.75	62	61.5	62	65	63.5	63.25	65.5	64	63.5	62.5	62.5	62
11.....	61.25	63.5	65	60	62.5	63.75	60.5	61	62	62	62	62.5	62	62	62.25	61	61	60.5
12.....	63	71.25	72.5	62	67.25	70.5	61	63	71.75	62	62.5	65	62	62	64.75	60.5	60.5	60.25
13.....	60	77.25	69.25	59.25	71	70.5	60	64.75	68.5	62.5	63	67	62.75	62.5	65	60.25	60.5	60.5
14.....	56.5	68.5	68	56.5	64.5	67.5	57.5	61	65.5	61	61	64.5	61.5	61.25	63	60.5	60.5	60.25
15.....	58.5	79	72	56	71.5	72	56.5	63.5	69	59.5	61.5	66.5	60.5	61	64.5	60	60	60
16.....	58	84	79	57.5	74.5	78	58.5	65.75	73	61.5	63	69.5	62	62.5	66.75	60.5	60.5	60.5
17.....	61.5	89.25	83.5	61.25	79	82.25	62	69.5	77	64.5	66	72.75	64.25	65	69.5	61.25	61.5	61.5
18.....	65	90	85	64.75	81	83.75	65.5	72	78.5	67.5	67.75	72.5	67.5	67.5	71.5	62.5	62.75	63
19.....	70.25	90	83.5	69	82.5	82.25	68.5	74.5	78	70	71.5	75.5	69.75	70	72.5	63.75	64	64
20.....	72	96	87	69.25	85.25	86	69	75.75	81.5	70.5	72.25	77.75	70.25	70.5	74.25	64.75	65	65
21.....	69	95.25	88	68.5	85	86.25	69.25	76	81.5	71.5	75	78	71.5	71.25	74.5	65.75	66	65.75
22.....	74.25	96.5	88.25	72	87.75	87.5	72	80	83.5	73.5	75.75	79.5	73	73.5	76.25	66.5	66.5	66.75
23.....	71	88.5	79	69.75	81.5	76.5	70.5	74.5	76.25	72.5	73	75.5	72.5	72	73.75	67.25	67.25	67
24.....	72	94	76.25	71	85	76.5	70	76	75	71.5	73.25	75	71	72	73.5	67	67	67
25.....	68	64.5	61.5	69	66.5	63.5	69.5	67.25	64.5	71	69.25	67	70.25	69.5	67.5	67	66.5	66
26.....	59.75	78	69.25	58	71.5	70.5	59	65.5	69.5	62.5	64.25	68.5	64	64.25	67	65	65	64
27.....	60.25	87.5	78.25	58.5	.....	78.25	60	.....	74.25	63.25	.....	71.5	64.5	.....	69	64.25	.....	64
28.....	64	87.5	81.5	62.5	79	81	63.5	70.5	77	66.25	67.75	74	66.75	67	71	64.5	64.75	64.75
29.....	67.5	90	84.5	66	83.25	83.5	66	75	79	68	71.5	76	68.5	70	73	65.5	65.5	65.5
30.....	67	88	83.5	67	80	83	68	73	79	70.25	71	76	70.5	70	73.25	66.25	66.5	66.5

APPENDIX C (Continued).

August — 1884.	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
1.....	62.75	77.5	76	61.75	74	76	62.5	68.25	73	65.5	67	71.25	66.5	66.5	69.5	66.25	66	66
2.....	62.25	80.25	80.75	61.75	75.75	80	63	69	75.75	66	67.5	73	67	67	70.75	66	66	66
3.....	68	84	83	67	79.5	81.5	67	73	77	69	71	74.5	69.5	70	72	66.5	66.5	66.5
4.....	71.5	84	80	70.5	79	78.5	70	74	75	71.5	72.5	74	71	71	72.5	67	67	67.5
5.....	68.5	76	74	68	73	74	68.5	70.5	72	70.5	70	72	70.5	70	71	68	67.5	67.5
6.....	61	73	71.5	65.5	70	71.5	62	66.5	69.5	66	66.5	69.5	67	67	68.5	67	67	66.75
7.....	61.5	78	73	61.5	72.5	73	62.5	67	71	65.5	66.5	70	66.5	66.5	69	66.5	66	66
8.....	63	70.5	69.5	63	67.5	70	64	65	68.5	66	66	68.5	67	66	67.5	66	66	66
9.....	57.5	73	73	57	69.5	73.25	58.5	65	70.5	62.5	64.5	69	64	65.5	67.5	65.5	65.5	65
10.....	60	76.5	73	60.5	72	73	61.5	66.75	71	65.5	65.5	69.75	65.5	65.5	68.25	65.5	65.5	65
11.....	62	81	76	62	74	76	63	68.5	73	65.75	67	71.5	66.5	66.5	69	65.5	65	65
12.....	62.5	80	80	62	74.5	79	63	68.75	75	66.5	67.5	73	67	67	70.5	66	66	66
13.....	65	84.5	81	64	78	81	65	71	77.5	67.5	69	73	68	68.5	72	66	66	66
14.....	66	84.5	84	65	78	82.75	66	72	78.75	69	70	76	69.5	69.5	73	67	67	67
15.....	70.5	87.5	87	69	81	86	68.5	74	81.5	70.75	72	78	71	71	75	67.75	68	68
16.....	70.5	89.5	89	69.5	82	87.5	70	75.5	83	72.5	73.5	79	72.5	72.5	76	68.5	69	68.5
17.....	72.5	89	87	71.5	83	85.5	71.5	76.75	82	73.75	74.75	79.5	73.75	73.5	77	69.5	69.5	70
18.....	70.75	91	88	71.5	83.5	86.25	72	77	82.75	74	75	80	74	74	77.25	70	70	70
19.....	72.5	91	89.25	72.5	83.25	88.5	72.5	77	83.5	74.5	75.5	80.5	74.5	74.5	77.5	70.5	70.5	70.5
20.....	73.5	85	86	72.5	80	86	73	75.75	81.5	75.25	75	79	75	74.5	77	71	71	71
21.....	74.75	90	86	72.5	83	85.5	73	77	82.5	75	75.75	80	75	75	77.5	71	71	71
22.....	73.5	81	75	74	77.25	75.5	74	74.5	74.5	75.75	75	75	75.5	74.5	74.5	71	71	71
23.....	63.75	84.5	79	63.5	76.25	79	65.5	70.75	76	69	70	74.5	70.25	70	73	70.5	69.5	69.5
24.....	62	78.5	70	62.5	71.5	72	64.5	68	72.5	68.5	68.5	72	69.5	69	71.5	68.5	69	69
25.....	56	74	67	57	68	68	60	64	67.5	65	65	68	67	66	68	68.5	68	68
26.....	64.5	80	76	64.5	73.5	75	64.5	68.5	72.25	66.5	67.5	71	67	67.5	70	67.25	67	67
27.....	61.5	80.5	79	61.5	73.5	78.25	63	68	75	66	67	72.75	67	67	70.5	67.25	67	67
28.....	62	82	78.5	62	74.5	77.5	63.5	69	74.5	67	68	73	68	68	71	67.25	67	67
29.....	67	74	70.5	67.5	72	71	67.5	69.5	70	69.5	69.5	71	69.5	69	70	67.5	67.5	67.5
30.....	66.5	80.5	72	65.5	72	72.25	65.5	68.75	70.5	68	68.5	70.5	68.25	68.25	69.5	67.5	67	67
31.....	61	76	73.5	61	69.75	73.5	62.5	66	71.5	66	66	70.25	66.75	66.5	69	67	67	67

APPENDIX — (Continued).

September — 1884	1 inch deep.			3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon	6 P. M.	7 A. M.	Noon	6 P. M.	7 A. M.	Noon	6 P. M.	7 A. M.	Noon	6 P. M.	7 A. M.	Noon	6 P. M.	7 A. M.	Noon	6 P. M.
1	58.5	78	75	59.5	71	75	61	66	72	65	65.5	70.5	66	65.75	69	67	65.5	66.25
2	59	83.5	79.25	59.5	74	78.25	61.5	67.25	74.5	65	66	72	66	65.75	70	66.5	66.25	66
3	68	90	86.25	66	80	84.5	66	72.25	80	68	69.75	76.25	68.5	69	73	66.5	67	67
4	70	89	87	69.25	82	85	69.75	75	80.75	71.75	72.75	77.75	71.5	71.5	75	68	68	68
5	72.25	92	85	71.5	82	85	71.75	75.5	82	73.5	74	79	73	73	76	69	69	69
6	69	92.5	83	68.5	82	82	69.5	74.5	79	72	73	77	72.5	72	75	69.5	69.5	69.5
7	73.5	95	87.5	72	85	89	71.5	77	82.5	73.25	74.75	79.5	73	73.5	76.5	69.5	69.75	70.5
8	73	81.5	81	73	77.5	81	73	74	79	75	74.75	77.5	74.5	74.25	75.75	70.25	70.5	70.5
9	70.75	85.5	85.5	70.5	81.75	84	70.75	75.25	80.25	73	73.75	77.5	73	73	75.5	70.25	70.5	70.25
10	71.5	91.5	79	71	84.25	83	71.5	77	82	73.5	74.5	80	73.5	73.75	77	70.25	70.5	70.25
11	70	80.75	72.5	70.75	78	74	71	74	74.5	73.5	74	75	73.5	73.25	74.25	70.75	70.75	70.5
12	58	75	70.5	59.5	70	72	65.5	66	71.25	67	67	71	68.5	67.75	70	69	69.5	69
13	57	70	66	58.25	66	67	60.75	63	67	65	64.5	67	66.25	65.5	67	68.5	67.5	67.5
14	49	74	68	50.5	66	69	54.5	60.25	67.5	60	60.5	66.5	62.25	62	65.5	66.5	65.75	65.75
15	54	77.5	72	55	69.5	72	57	63	69.75	61	62	68	62.5	62.5	66.5	65.5	65	65
16	64	85	82.5	64	70.5	72.25	64.25	69.5	70.5	65.75	67	70.5	66	66.5	68.5	65.25	65.5	65.5
17	61.25	74.5	71	62	69	72.5	63	65.5	70.5	66	65.75	69.5	66.25	65.75	68	66	65.5	65.75
18	55.5	60	59	58	60.5	60.5	60.25	60.5	60.75	64	63	63	65	64	63.5	66	65.5	65
19	48.5	73.25	67	50.75	65.5	67.5	53.5	59.5	65.5	58.5	59.5	64.75	60.25	60	63.75	64.5	63.75	63.75
20	58	64.5	58	58.75	60.5	60.5	59.5	68.75	61	61.75	61	62.75	62.5	61.75	62.5	63.5	63.75	63.5
21	49.5	71	64	50	64	65	52.25	58.5	63.25	57	58	62.5	59	59	61.5	63	62	62
22	54.5	66	62	55	62.25	63	56	59	62	59	59.5	62.25	60.5	60.5	62	62.5	62	62
23	56	65.25	63	56.5	61.75	63	57.25	59	66.25	60	60	62.25	60.5	60.5	62	62	62	62
24	63	71.25	70	63	67.75	69	61	63.75	66.25	62.25	63	65.5	62.25	61	64.5	62.25	62.25	62.5
25	62	71.5	63	62.25	67	64.75	62.5	63.25	64.75	64.25	63.75	65.25	64	63.75	64.5	63	63	63
26	51	70	62	52.5	64.5	65.75	55	60	61	59.25	60	64	60.75	60.5	63	62.75	62.5	62.5
27	57.75	61	62.5	57.5	59.75	62.5	57.5	58.5	61	60	60	61.75	61	61	61.5	62.5	62.5	62.5
28	64.25	74	69	63	69.5	68.75	61.5	65	67	62.5	63.75	66.5	62.25	63	65.25	62.25	62.5	62.5
29	63.25	79	68.5	63	72.5	70	62.5	66.5	69	64	65	68	64	64.5	66.75	63	62.5	63
30	58.5	63.25	66	59	62.25	65	60	61	63.5	62.5	62.25	64	63.5	62.75	63.5	63.5	63.25	63.5

APPENDIX --- (Concluded).

October - 1884.	3 inches deep.			6 inches deep.			9 inches deep.			12 inches deep.			24 inches deep.		
	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.	7 A. M.	Noon.	6 P. M.
	63.5	74	65	62.5	69.5	66	62.5	64.75	65.5	63.75	64	65.25	63.25	63.25	63.25
1.	53.5	58.5	56.5	57	58.5	57.5	58.5	60.75	58	59.5	61.5	61.5	63.25	63.25	63.25
2.	54	60.75	60.5	54.5	58	60.75	55	58	60	59.5	62	60.25	62.25	62.25	61.75
3.	61	80	73.25	58.5	73	72.5	67.5	62.5	65	64.5	62	65	61.25	61.5	62
4.	61	73	65.5	62	67.5	69	67	64	67.5	62.5	64	65.5	62.75	63	63
5.	62	76	68	60.25	70	69	68	63.5	68	62	63.5	65.75	63	63	63
6.	55	68.5	61.5	56.25	63.25	62.75	62.75	61.5	62.75	62.25	61.75	63	63	63	62.5
7.	53.75	52	59.25	54.75	57.5	59.5	58.75	59	58.75	57.5	59.75	60.25	62.25	62.25	60
8.	40	37	32.5	43.25	48	55	56	54.5	56	53.75	50.25	57.75	61.25	61	60.5
9.	41	65	58	43.25	58	59.5	58	55	58	55.5	53.75	57.25	60	59.5	59
10.	48	67.25	63.75	49	60.5	64.25	61.25	54.25	61.25	59.75	55.5	59	59.5	59.75	58.75
11.	62.25	66.25	65	61	64	60.5	61.25	60.75	61.25	61	60.75	61.75	60.25	60.5	60.25
12.	59	65.25	58	59	63.75	53.75	55	54.5	55	57.75	56.5	57.25	60.25	60.25	59.5
13.	45	58	51	48.25	53.75	54.25	54.25	50.5	54	53	52.5	55	58.5	58.5	58
14.	37.5	55	52.5	40.5	54	56.25	54.25	53.75	54.5	53.75	53.75	55	57.5	57.5	57.25
15.	49.5	55	49	51	56.25	52	52	54.75	53.5	53.5	55	56	57.25	57.25	57.25
16.	42	59	45	44	49.5	47.5	46	50.5	49	53.5	51.5	56	57.25	56.5	56.5
17.	36	46	49	44	44	48	41	50.5	47	52	48	52.5	57	55.25	53
18.	45.75	67.5	61.25	46	61.25	61.25	46	46.25	48.5	48	48.25	49	54.5	54.5	54.5
19.	51	69.5	63	51.5	60	63	51.75	55	58.5	54.5	54.75	55	55.25	55.25	55.25
20.	59	57.25	52.5	58	57.25	54	57	57.75	58	56	57.5	57	57.75	57	57
21.	43	52.5	42.25	45.25	50	46	47.5	51	48.5	53.25	52.5	53.75	56.5	56.5	56
22.	35.5	48.75	41.5	..	46.25	44	41.5	46.5	45	48.75	48.5	49	53	54.75	54.75
23.	39	43.75	37.25	..	48.75	..	41	43.25	42.25	47.25	47.25	47	53.5	53.5	52.75
24.	31	47	43	..	42.25	..	36.25	45	43.25	44	43.75	46	51.75	51.75	51.75
25.	40	43.5	42.5	44.5	43	46.5	42	45	45	46.5	46.5	47	51.5	51.5	51.5
26.	49.5	50	44.5	49	49.25	46	48	49.25	47	49	49.25	49.5	51.25	51.25	51.25
27.	39.5	48	44.5	..	46	45	42	45.75	45	46.75	47.5	48	51.25	51.25	51.25
28.	44	50	47.5	44.5	48	47.75	44	46.75	47	48.25	48.25	49.75	51.5	51.5	51.5
29.	44	53.5	48.5	44.5	49.25	49	44.75	47.5	46.75	48.5	48.5	49.75	51.5	51.5	51.5
30.	44	53.5	48.5	44.5	49.25	49	44.75	47.5	46.75	48.5	48.5	49.75	51.5	51.5	51.5
31.	43.5	53.5	48.5	44.5	49.25	49	44.75	47.5	46.75	48.5	48.5	49.75	51.5	51.5	51.5

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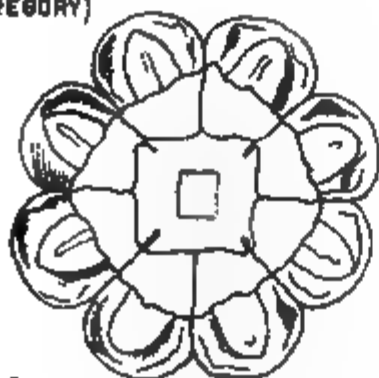
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Y.	
Yellows in peach	372
W.	
Wheat, improvement of	83
moisture in	79

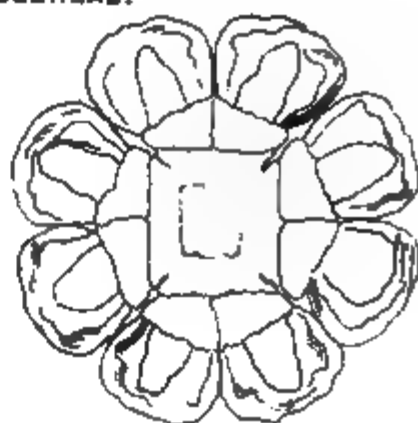
SWEET CORN.

PRATT'S EARLY.
(GREGORY)



No 1
1/4 SIZE

MARBLEHEAD.



No 2
1/4 SIZE

NARRAGANSETT EARLY.

RED R

No 3
1/4 SIZE

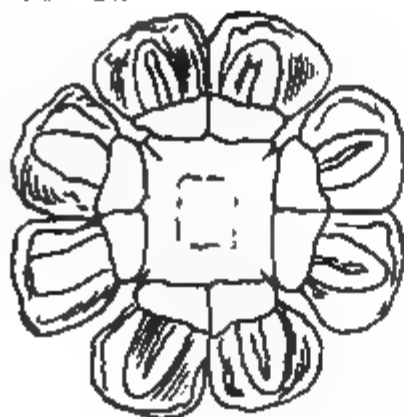
EARLY MINNESOTA.

No 4
1/4 SIZE

TOM

No 5
1/4 SIZE

BOLLY BUTTON



No 7
1/4 SIZE

No 6
1/4 SIZE

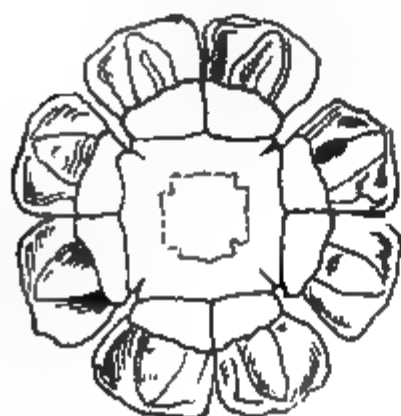
WYOMING

No 8
1/4 SIZE

1/4 SIZE

SWEET CORN.

DARLINGS EARLY



Nº 9

1/4 SIZE

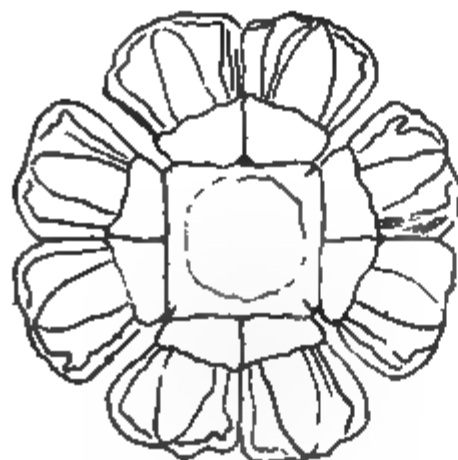
WARP EARLY.

Nº 10

1/4 SIZE

LDEN SWEET
S-R
181

IGHT ROWED EARLY.



Nº 11

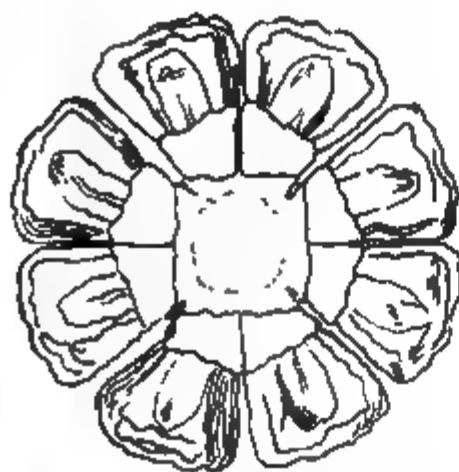
1/4 SIZE

Nº 13

1/4 SIZE

BLACK MEXICAN

TRIUMPH



Nº 12

1/4 SIZE

Nº 14

1/4 SIZE

RED CORN



Nº

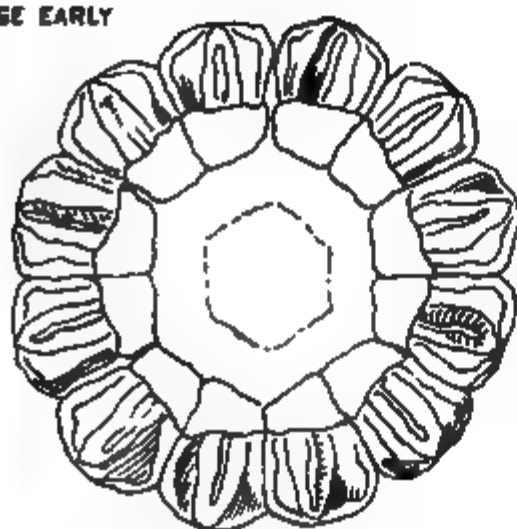
1/4 SIZE

SWEET CORN.

ORANGE EARLY



1/4 SIZE



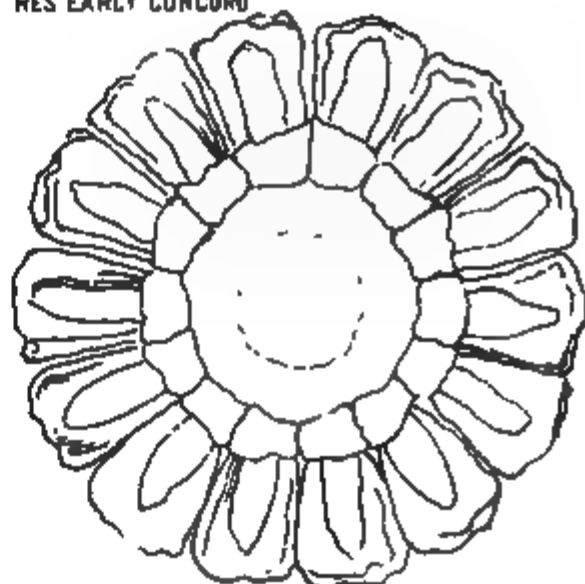
Nº 16

RENESEE EARLY

1/4 SIZE

Nº 17

RES EARLY CONCORD



1/4 SIZE

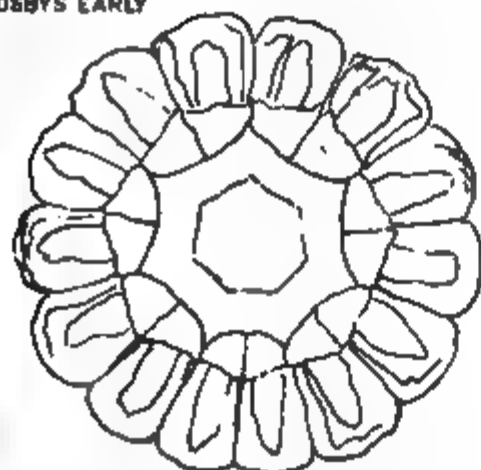
Nº 19

CROSBYS EARLY

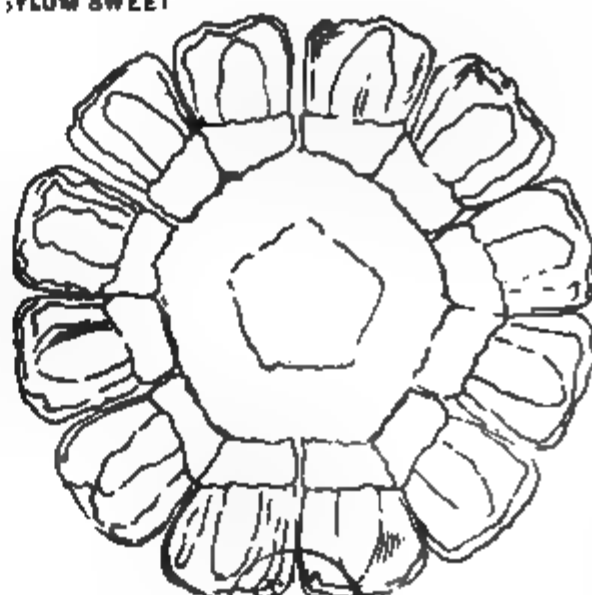


1/4 SIZE

Nº 18



SYLUM SWEET



1/4 SIZE

Nº 21

AMBER CREAM

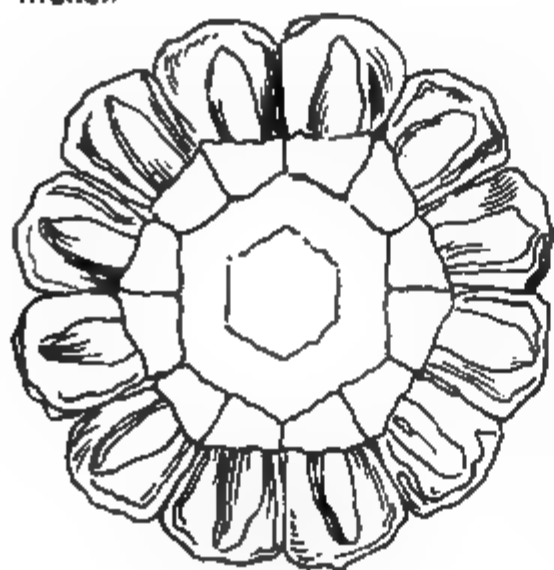


1/4 SIZE

Nº 20

SWEET CORN.

HICKOX



Nº 22

1/4 SIZE

IL

Nº 24

1/4 SIZE

BL

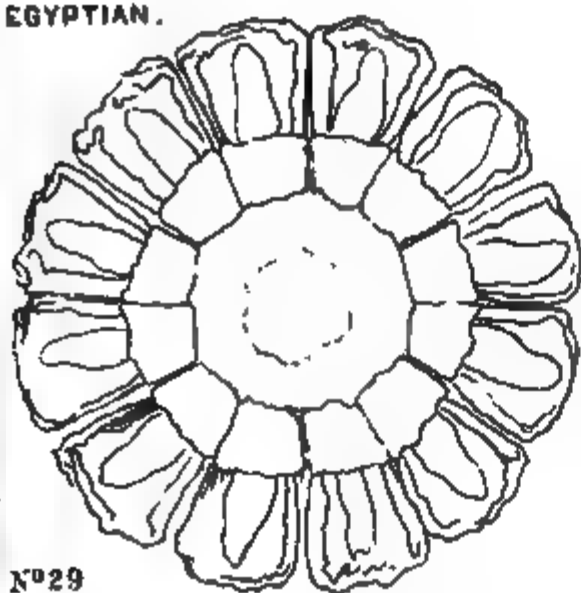
1/4 SIZE Nº 25

SQUALTUM



SWEET CORN.

EGYPTIAN.



No 29

See 5128

LANDRETH.



No 5128

No 1



No 33





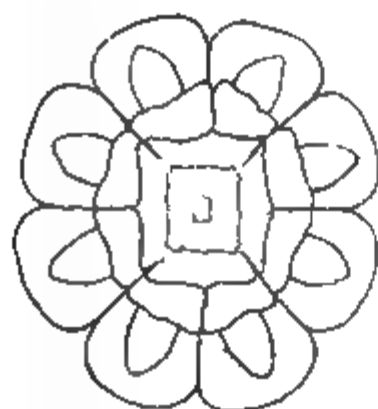
FLINT CORN.

EARLY CANADA.
(VAUGHAN)
CANADA STURT

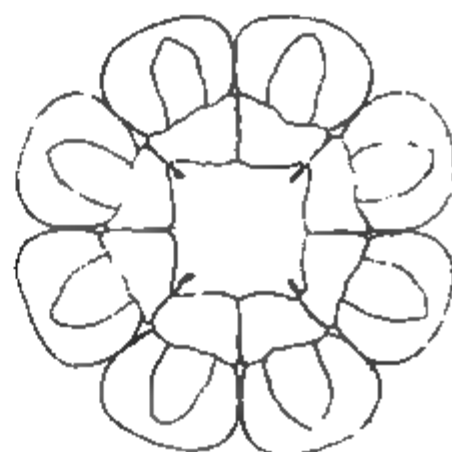


Nº 2

1/4 SIZE



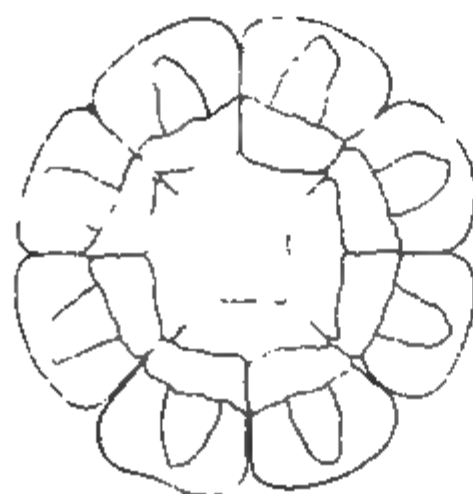
WAUSHAKUM.



Nº 5

1/4 SIZE

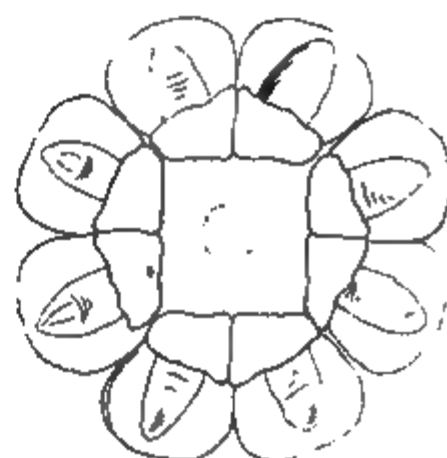
ORANGE FLINT



Nº 6

1/4 SIZE

GOLDEN DEW DROP.



Nº 7

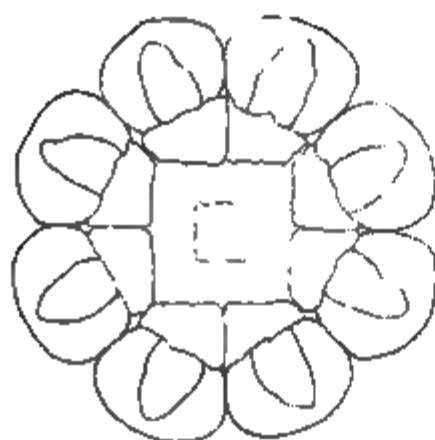
1/4 SIZE

LONGFELLOW
(SIBLEY.)

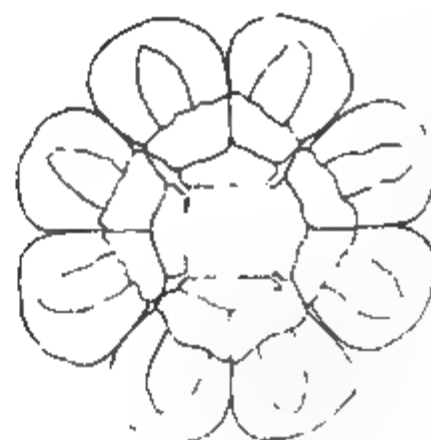


Nº 8

1/4 SIZE



KING PHILIP



Nº 11

1/4 SIZE

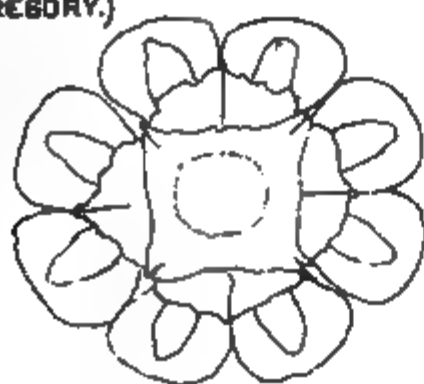


FLINT CORN.

FORTY DAYS
(GREGORY.)

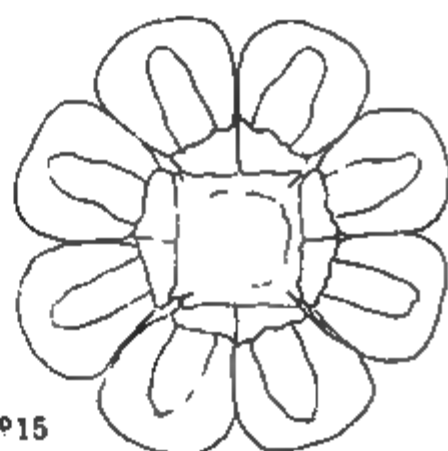


1/4 SIZE



Nº 14

RHODE ISLAND WHITE CAP.



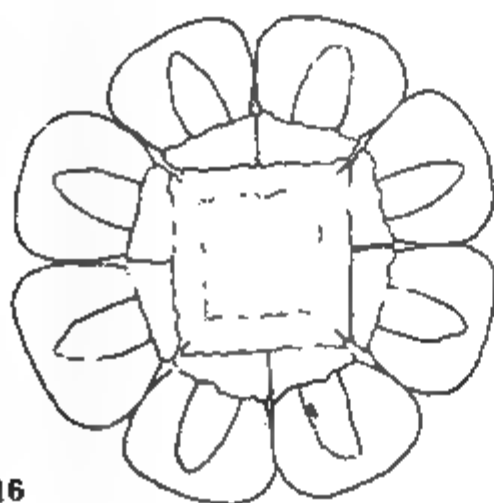
Nº 15

1/4 SIZE

CONNECTICUT WHITE FLINT.

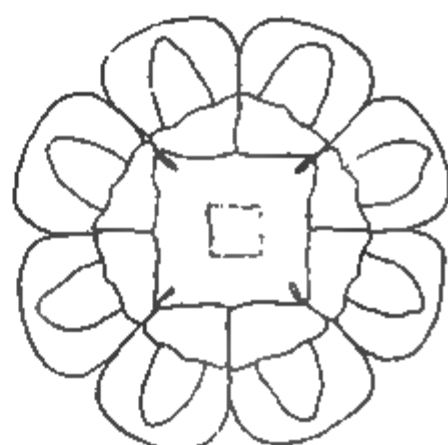


1/4 SIZE



Nº 16

SILVER WHITE FLINT
(VAUGHAN)



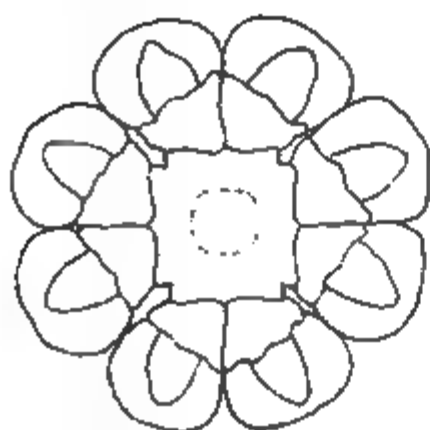
Nº 17

1/4 SIZE

LACKAWAXEN.
(PERRY 1881.)

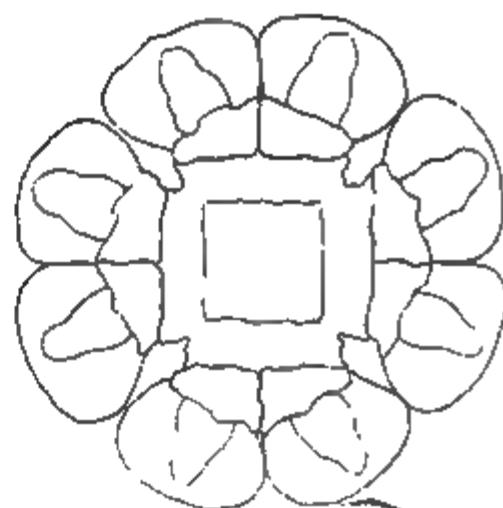


1/4 SIZE



Nº 18

SANFORD.



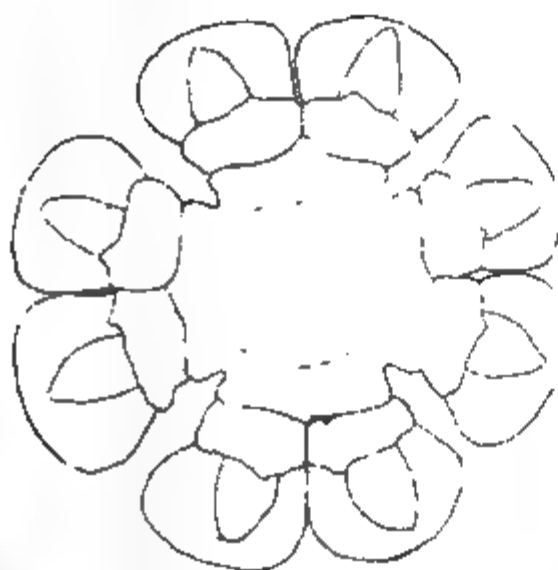
Nº 19

1/4 SIZE



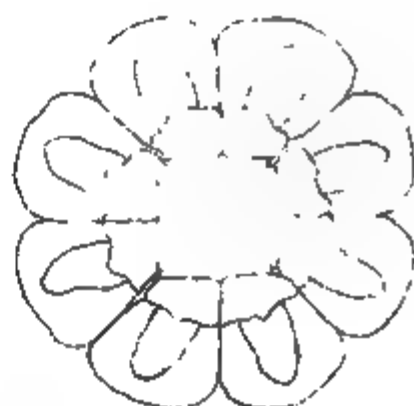
FLINT CORN.

RURAL THOROUGHBRED FLINT



Nº 20

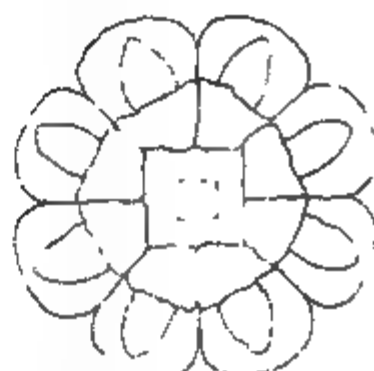
CANADA
EW ENGLAND 8 ROWED FLINT



Nº 21

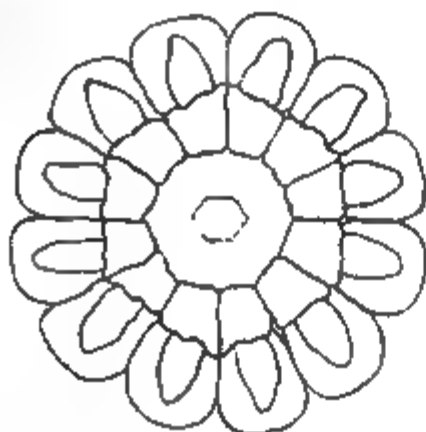
$\frac{1}{4}$ Size

LONG YELLOW
LANDRETH
1883



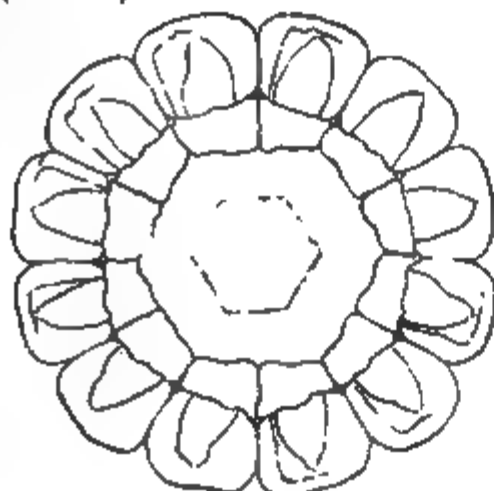
Nº 23

CANADA 12 ROWED
(FROM P 2)



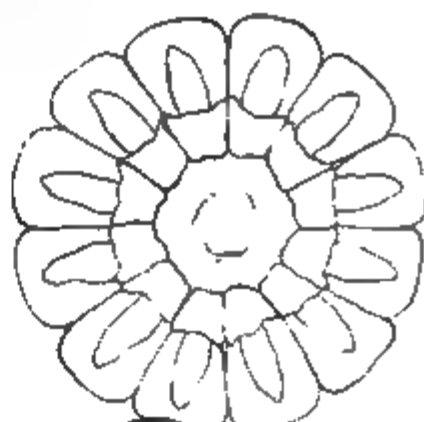
Nº 29

COMPTONS SURPRISE
(THORB)



Nº 30

EARLY DUTTON.



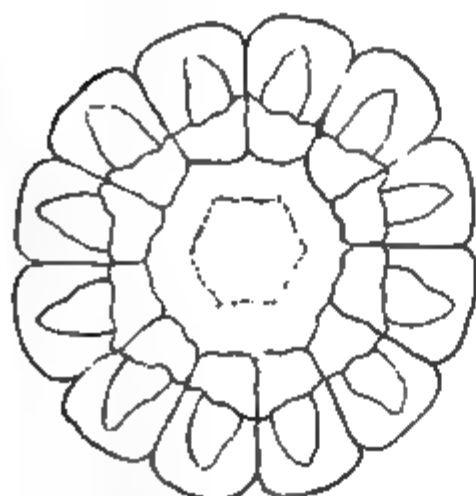
Nº 31



FLINT CORN.



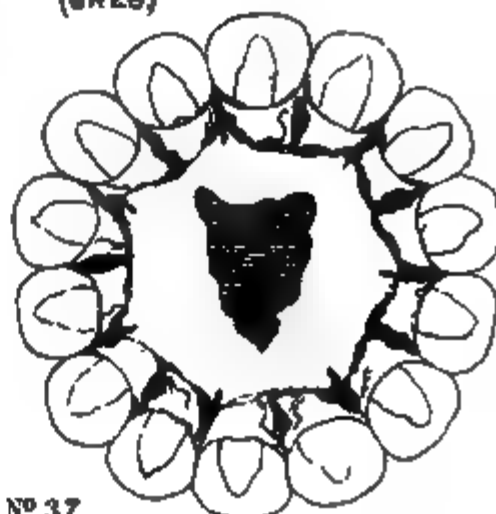
NEW ENGLAND 12 ROWED
(GOLD)



Nº 32

1/4 SIZE

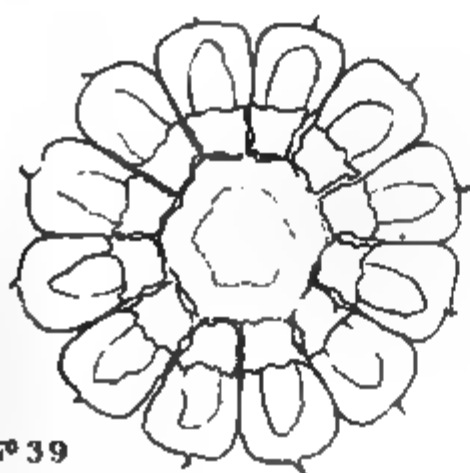
CHINESE GOLDEN
(GREG)



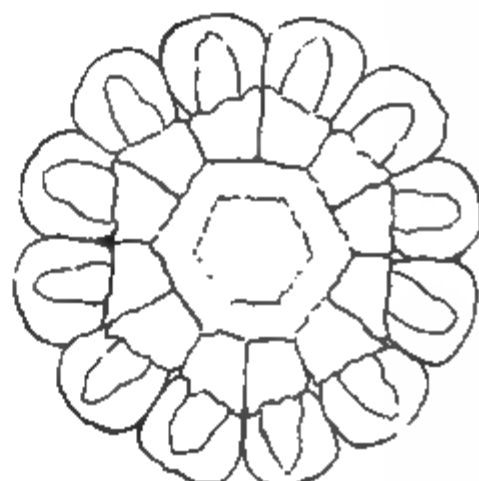
Nº 37

DUTTON.

MAIZE FROM AFRICA E. I.
(LANDRETH 1884)

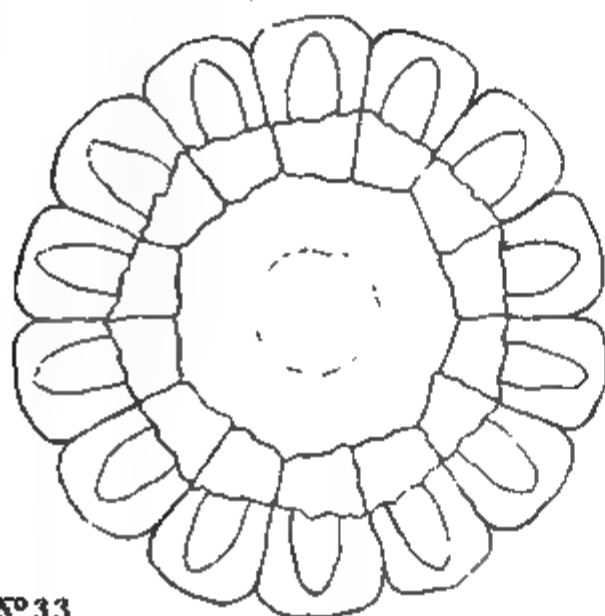


Nº 39



Nº 34

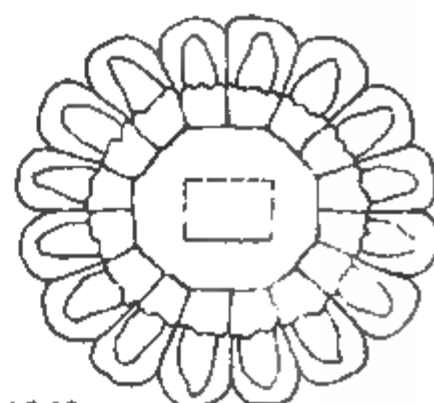
LARGE WHITE FLINT
OR HOMINY
(BLISS 1881)



Nº 33

1/4 SIZE

FRENCH YELLOW SIX WEEKS VIL.
VAUGHAN 1884.



Nº 38

1/4 SIZE



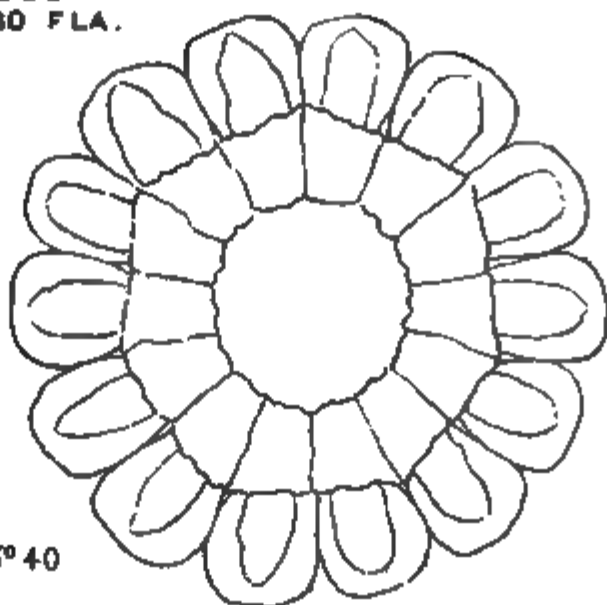
1/4 SIZE



Printed by Wood Parson & Co.

FLINT CORN.

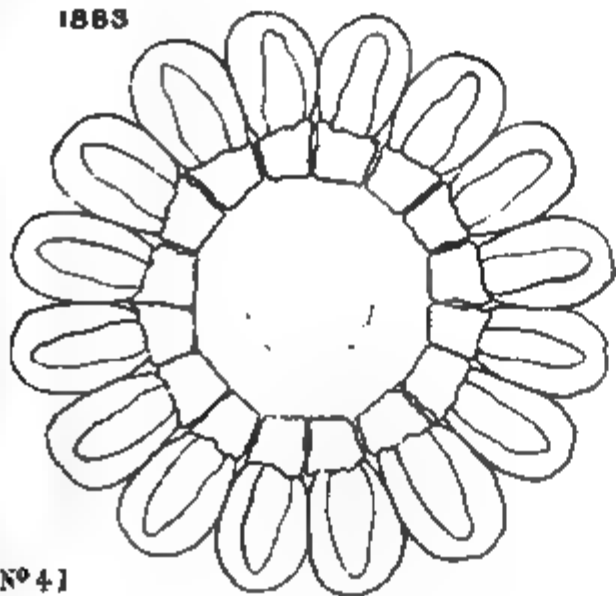
CUBAN
80 FLA.



No 40

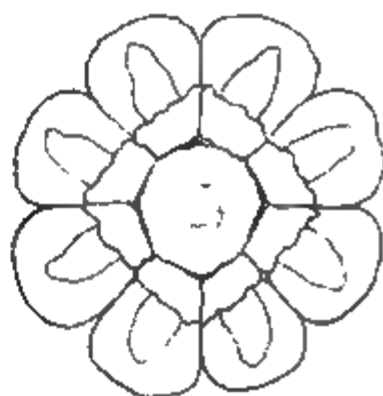
$\frac{1}{4}$ size

FRANKING YELLOW
PROF DABNEY, N.C.
1883



No 41

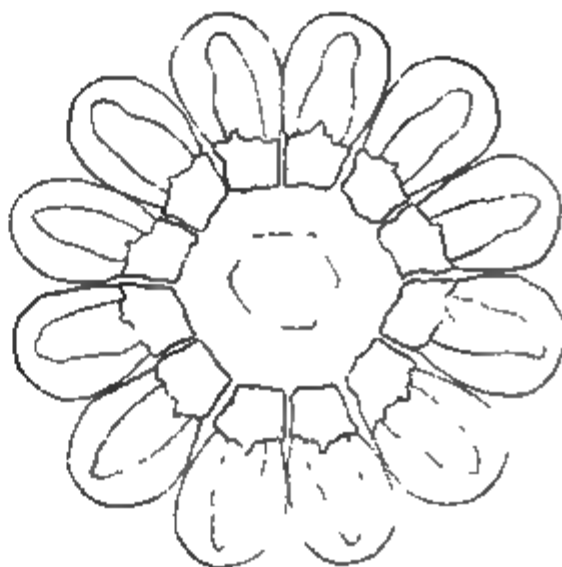
TOP OVER
HIRAM C FOLGER
NANTUCKET, MASS



No 43

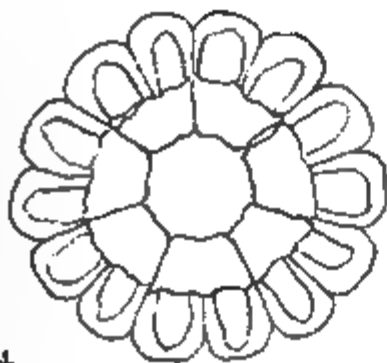
$\frac{1}{4}$ size

GOLDEN YELLOW
KAN AGR COLL
1882



No 42

JAPANESE STRIPED.



$\frac{1}{4}$ size No 44



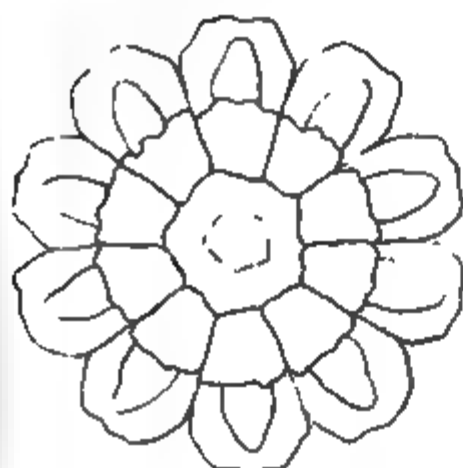
$\frac{1}{4}$ size

DENT CORN.

BENTON DENT.

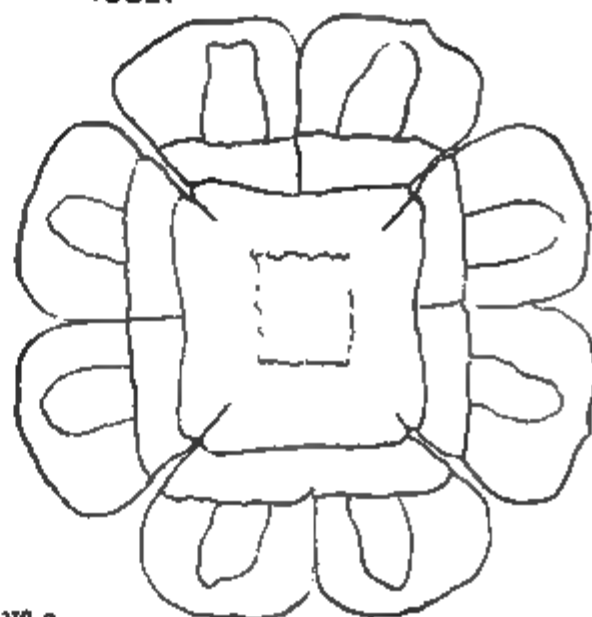


1/4 SIZE



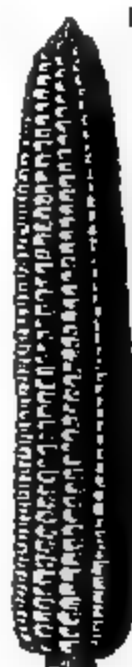
Nº 1

BRINDLE DENT
PROF BEAL
1882.

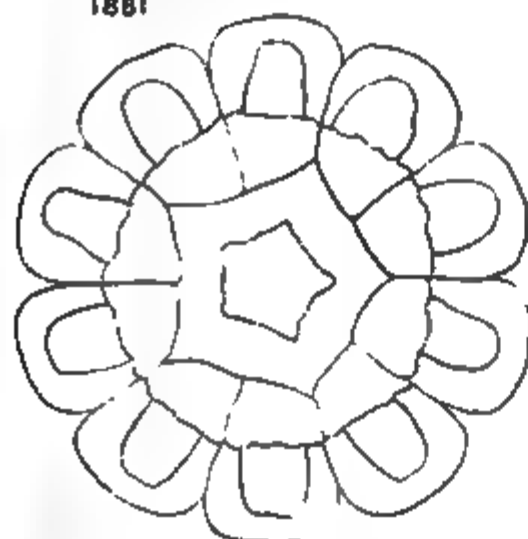


Nº 2

BALDWIN'S BRANCHING
W B BAGLEY
CLIFTON SPRINGS, N Y
1881



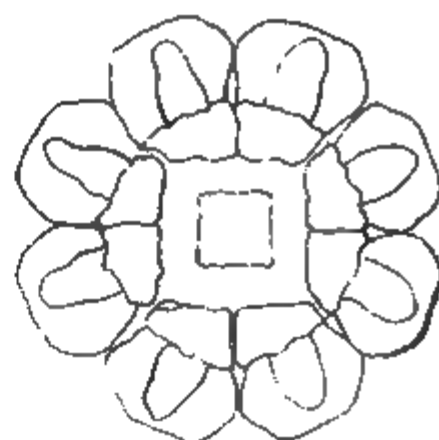
1/4 SIZE



Nº 3

1/4 SIZE

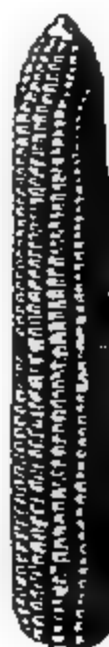
LOUNTS PROLIFIC
THORP 1884



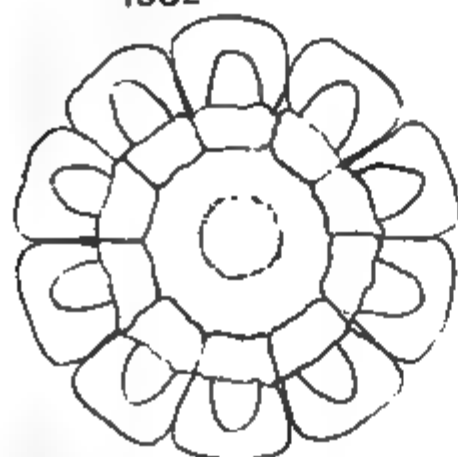
Nº 4

1/4 SIZE

PROLIFIC
A S WILLEY
MANCHESTER, TENN
1882

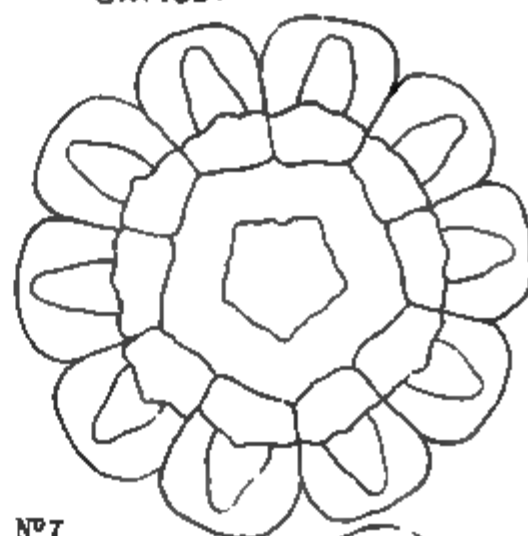


1/4 SIZE



Nº 5

LONG ISLAND WHITE
THORP 1883
STA 1884



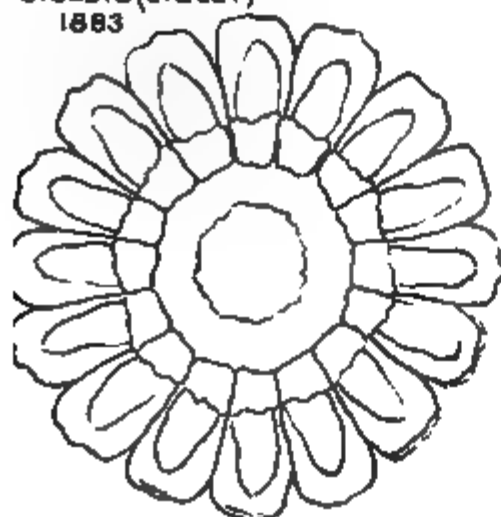
Nº 6

1/4 SIZE



DENT CORN.

PRIDE OF THE NORTH
GODDARS (VAUGHAN)
SIBLEYS (SIBLEY)
1883

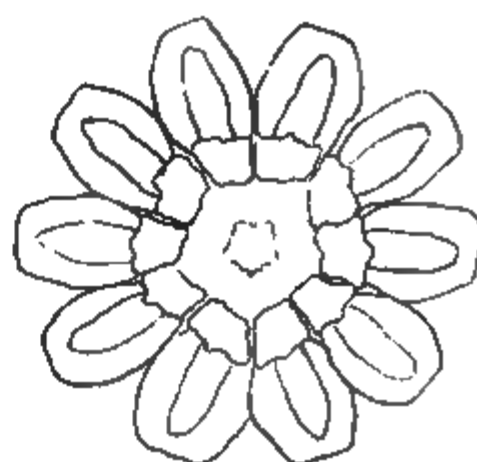


Nº 12

WRIGHT CORN.
R H DULONG
UPPERVILLE, VA
1884

1/4 SIZE

SMEDLEY
SIBLEY, 1882



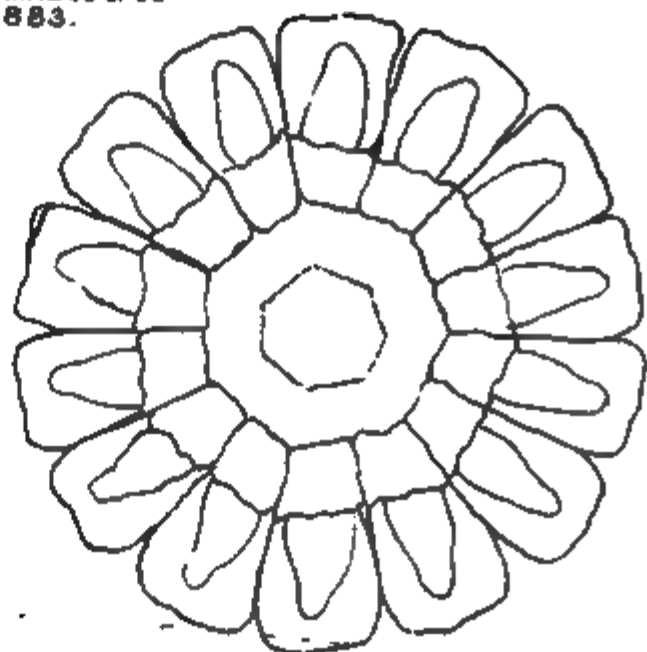
Nº 13

Nº 10



DIENT CORN.

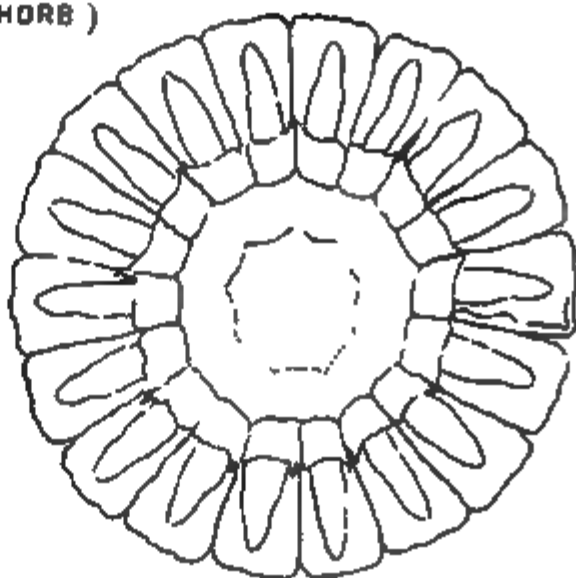
FARMERS FAVORITE
BENSON, MAULE & CO
1883.



No 14

4 SIZE

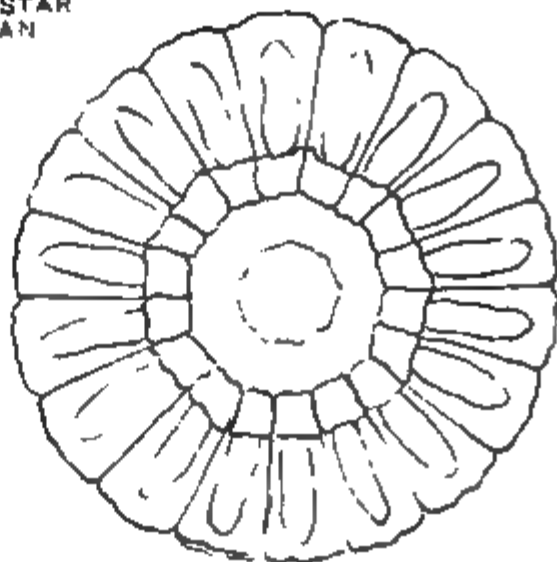
QUEEN OF THE PRARIE
(THORB)



No 15

4 SIZE

ORTH STAR
VAUGHAN

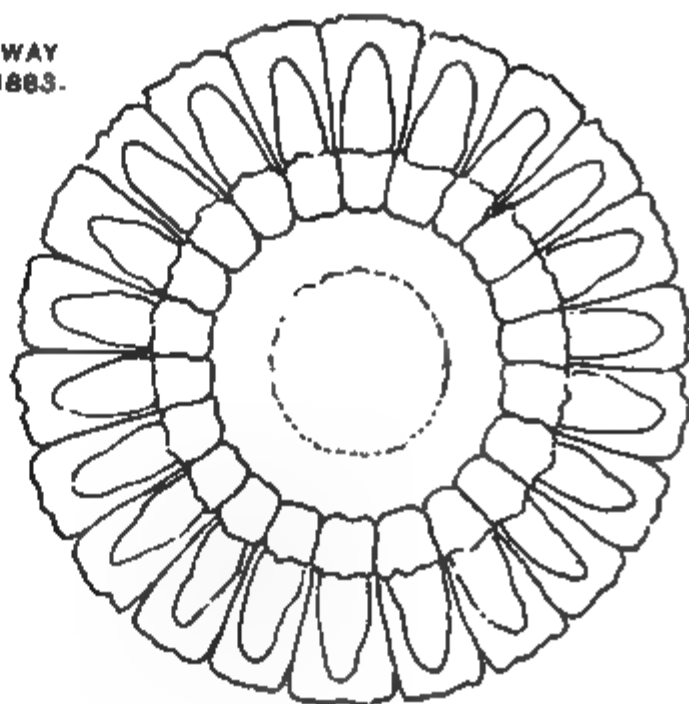


No 16

4 SIZE

DENT CORN.

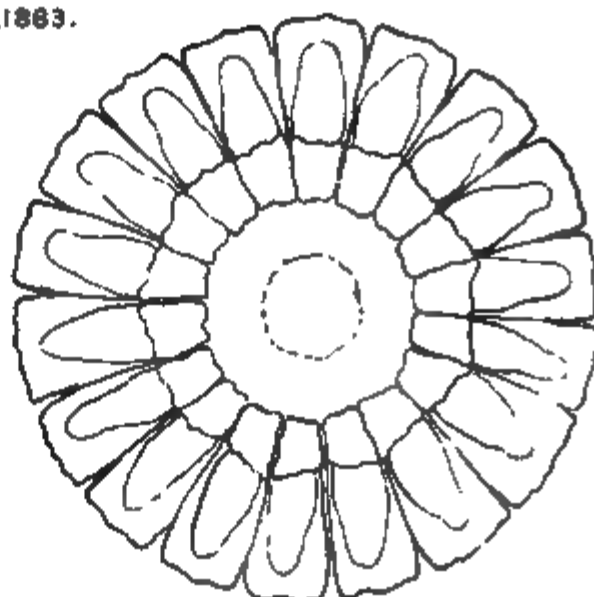
HATHAWAY
FERRY 1883.



Nº 17

1/4 SIZE

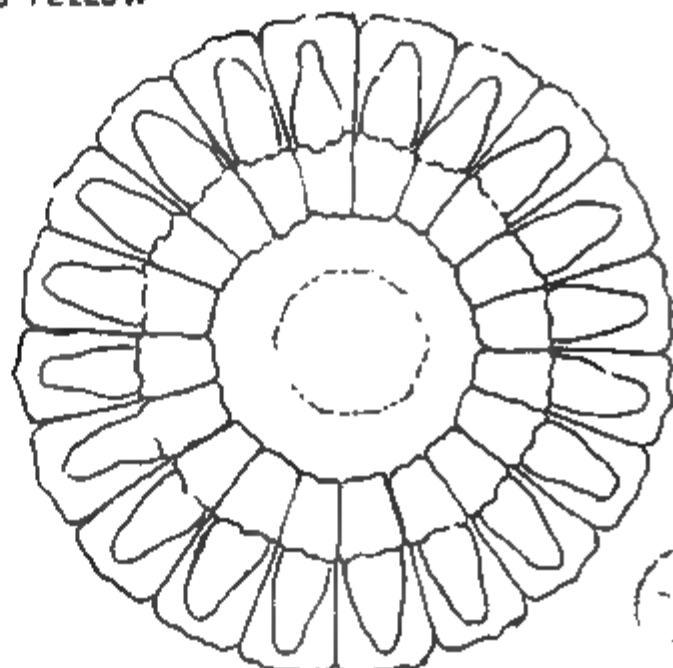
LEAMING
VAUGHAN, 1883.



Nº 18

1/4 SIZE

ILLINOIS YELLOW



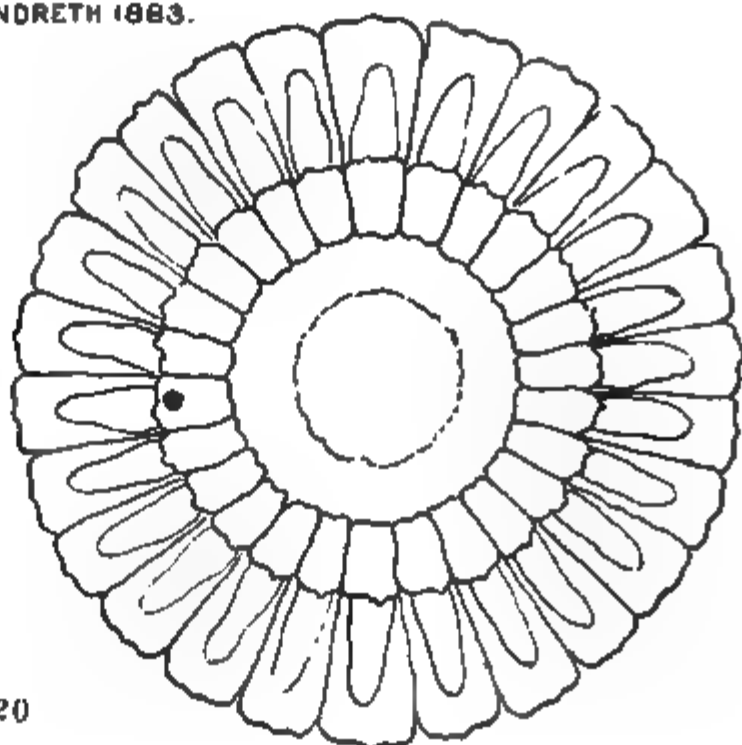
Nº 19

1/4 SIZE



DENT CORN.

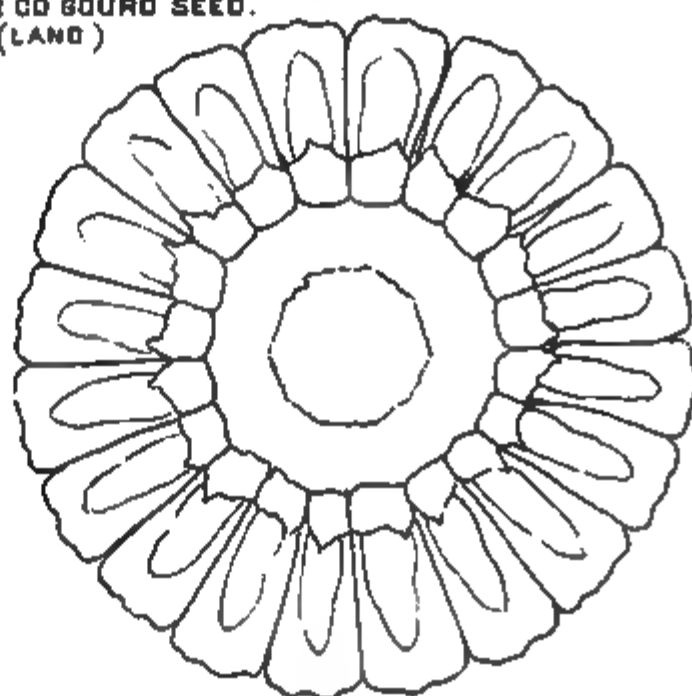
AMMOTH CHESTER CO EARLY
LANDRETH 1883.



No 20

1/4 size

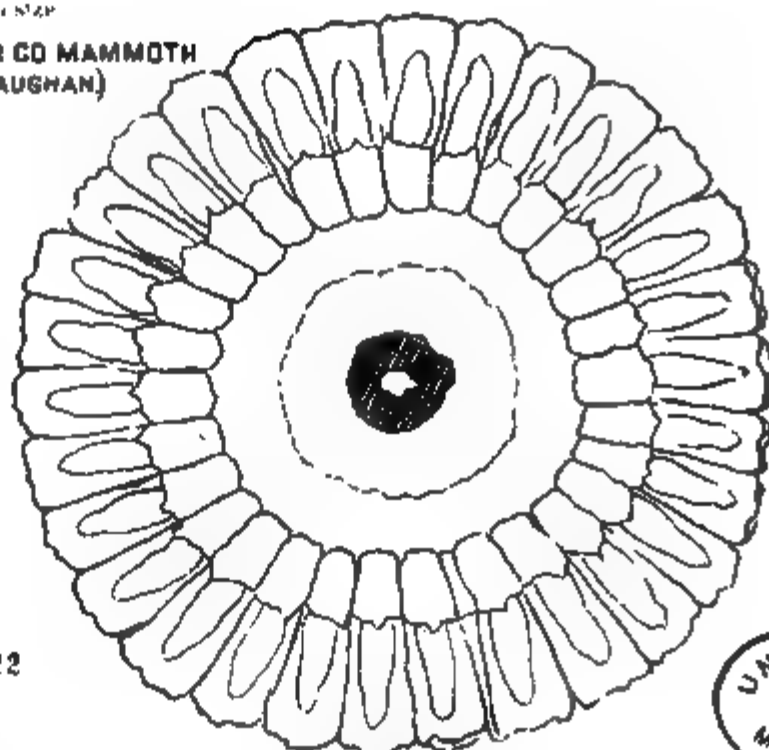
CHESTER CO BOURBON SEED.
(LAND)



No 21

1/4 size

CHESTER CO MAMMOTH
(VAUGHAN)



No 22

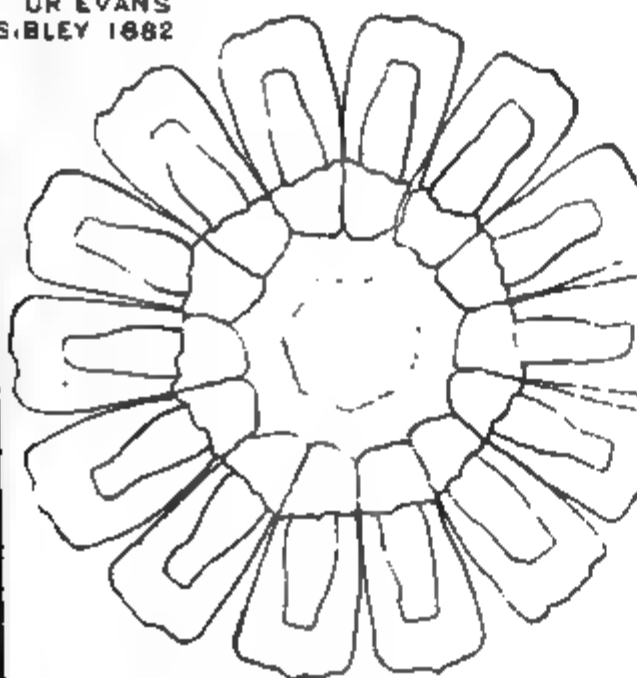
1/4 size



DENT CORN.

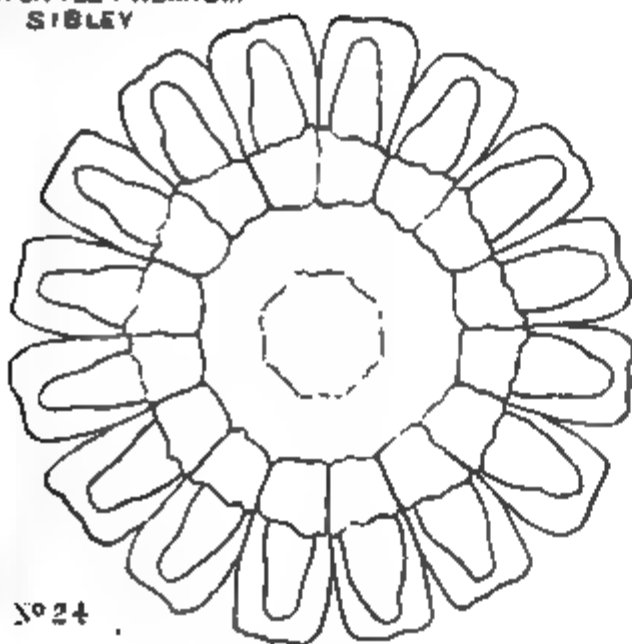
SOUTHERN PROLIFIC
OR EVANS
SIBLEY 1882

CHEROKEE



No 23

FOX OR LITTLE PREMIUM
SIBLEY



No 24

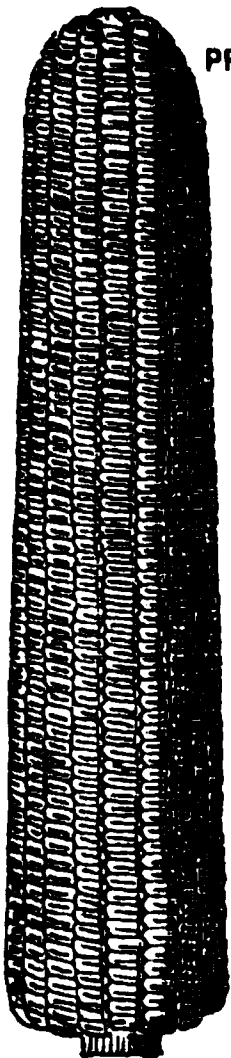
UPCHURCH'S

DENT CORN.

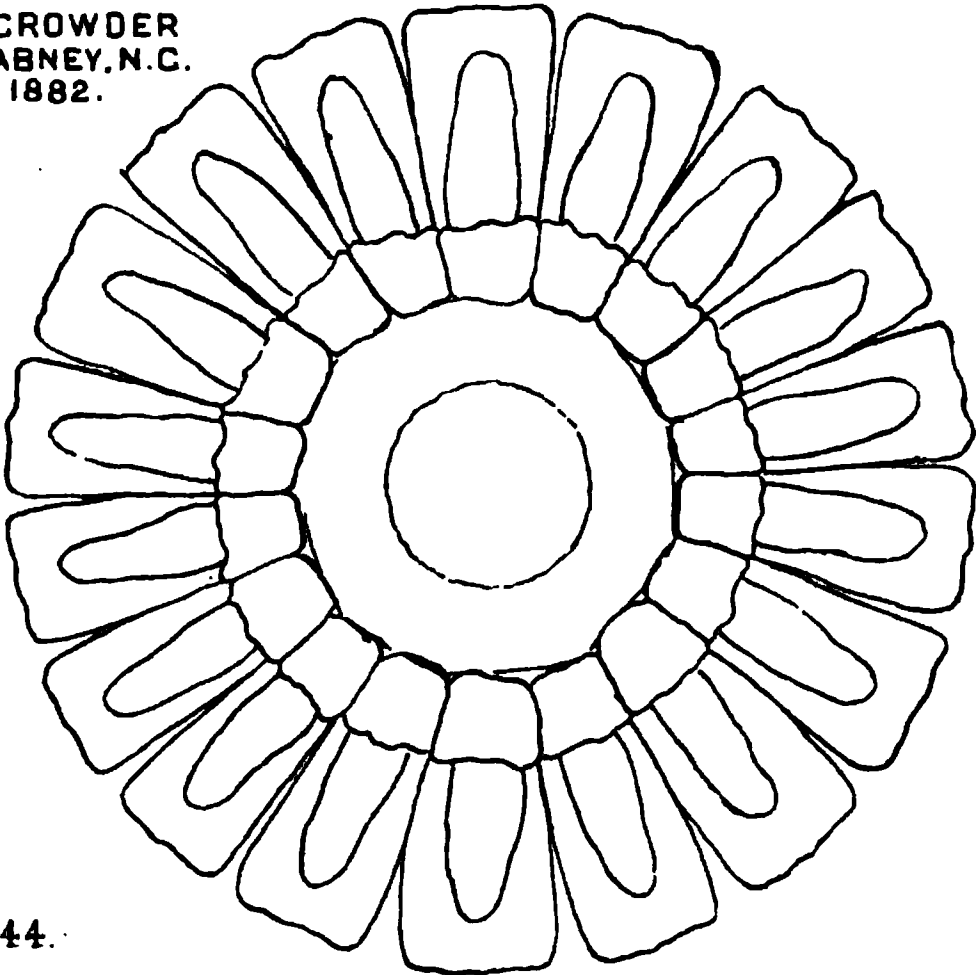
DIENT CORN.

DENT CORN.

DENT CORN.

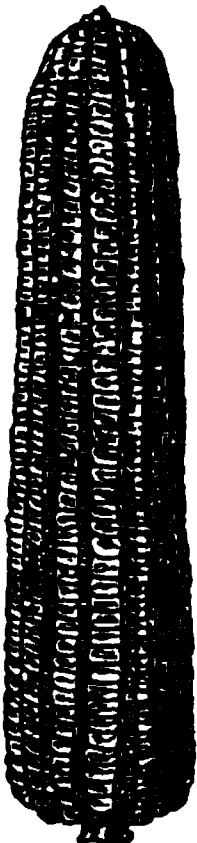


THE CROWDER
PROF. DABNEY, N.C.
1882.

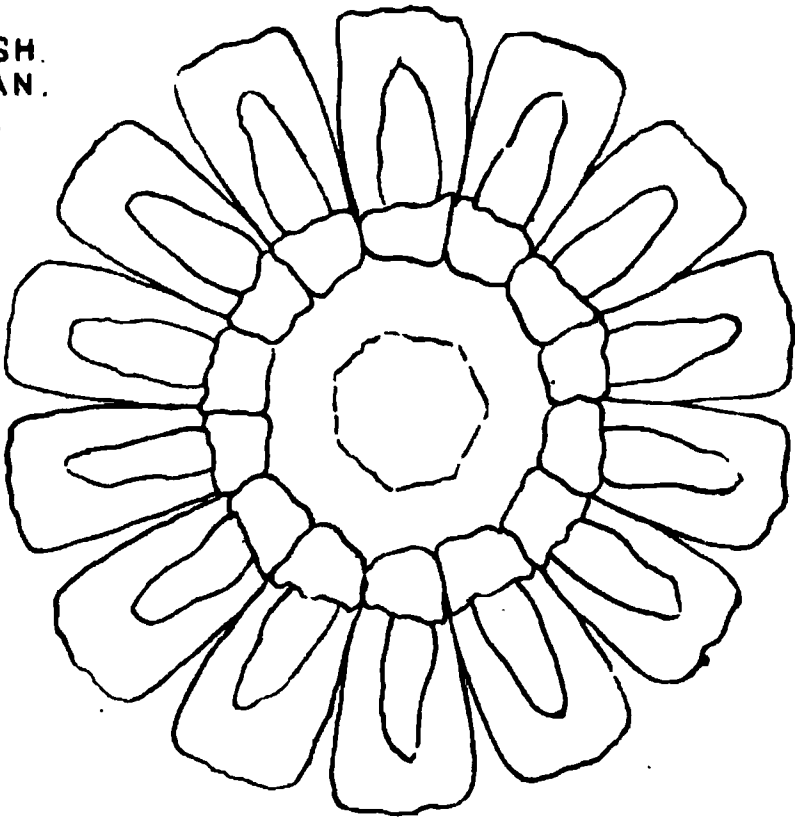


No 44.

1/4 size

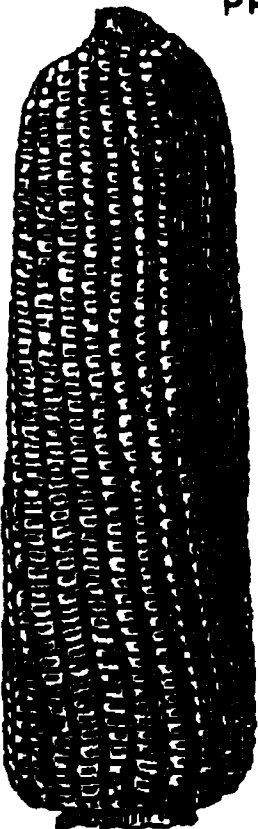


PARRISH.
VAUGHAN.
1883.

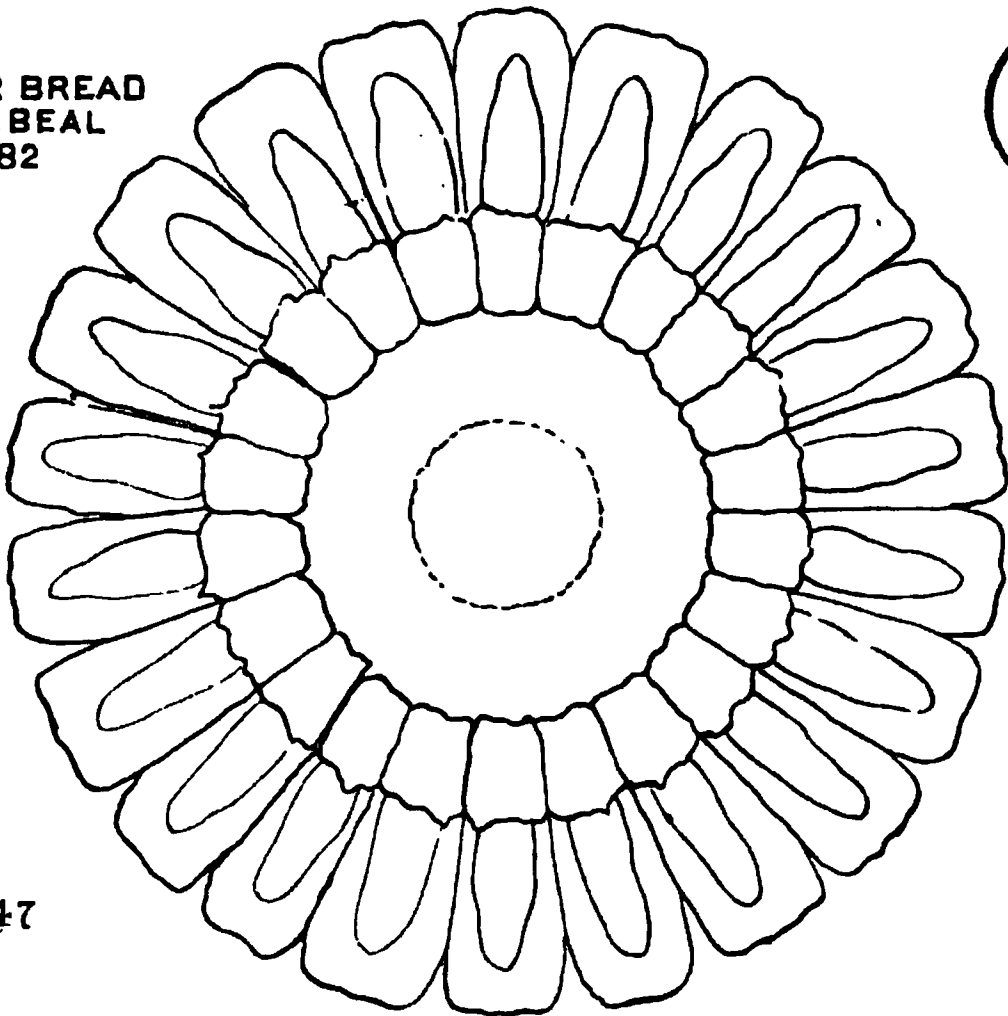


No 46.

1/4 size



PROCTOR BREAD
PROF. BEAL
1882



No 47

1/4 size



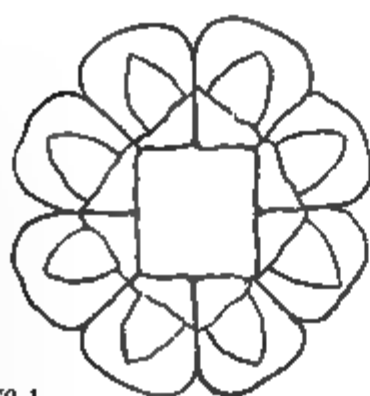
SOFT CORN.

RED RIVER.



1/4 SIZE

Nº 1



SQUAW OR MANDAN

Nº 2

1/4 SIZE

OMAHA,
SIBLEY, 1884



1/4 SIZE

Nº 3

ZUNI PURPLE SPECKLED
CUSHING 1883

Nº 4

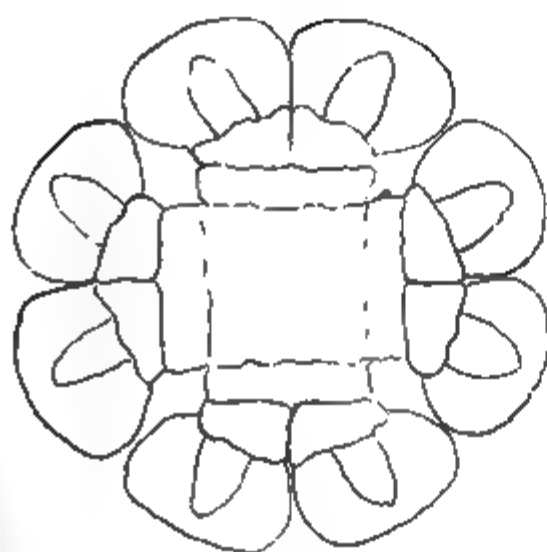
1/4 SIZE

TUSCARORA.



1/4 SIZE

Nº 5



ZUNI YELLOW.
CUSHING 1883



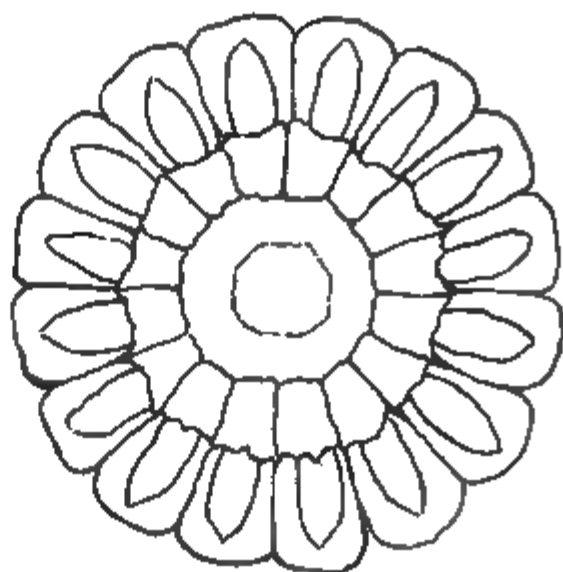
Nº 7

1/4 SIZE



SOFT CORN.

ZUNI BLUE,
SEED FROM F H CUSHING.
ZUNI INDIANS



Nº 8

'MUMMY' CORN.

1/4 size

ZUNI BLACK
CUSHING 1883.

1/4 size

Nº 11



Nº 10

1/4 size

CUZCO



Nº 12

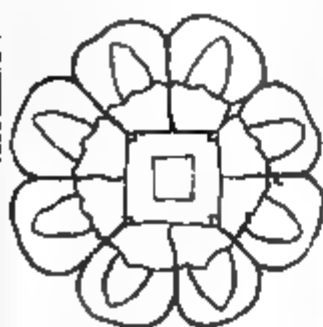
full size



POP CORN.



NONPAREIL
1883

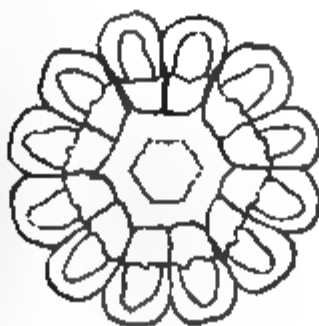


Nº 1

1/4 size



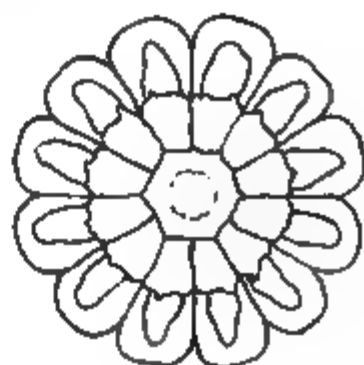
SILVER LACED
GREG 1883.



Nº 2

1/4 size

WELVE-ROWED WHITE.



Nº 3.

1/4 size

DWARF GOLDEN.



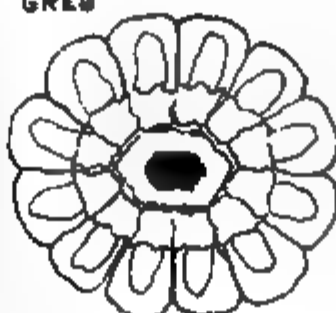
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Nº 4

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GREG



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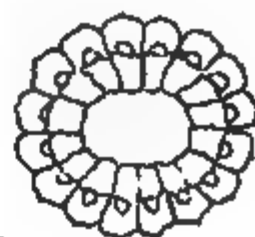
Nº 5

MINIATURE MAIZE
(THORP)



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Nº 6



WHITE PEARL



1/4 size

Nº 5 1/2.

RED PEARL.



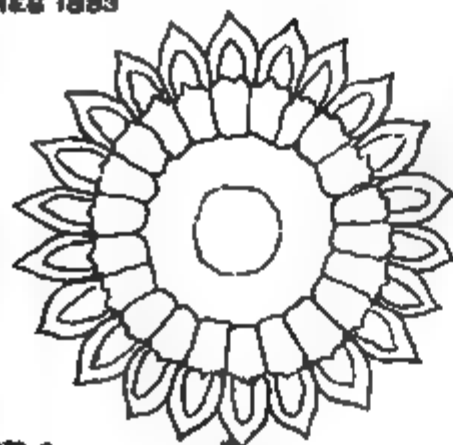
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Nº 7

EGYPTIAN.
GREG 1883



Nº 9

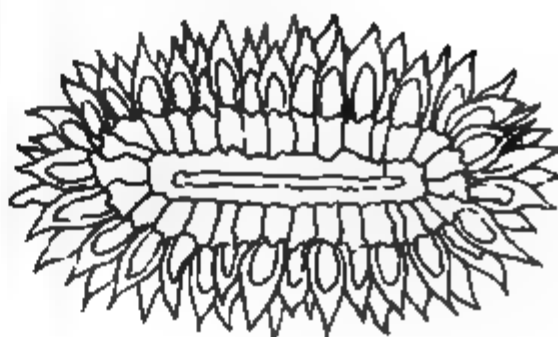


BEAR'S FOOT
HARRIS 1884.



1/4 size

Nº 10



POD CORN.

SWEET

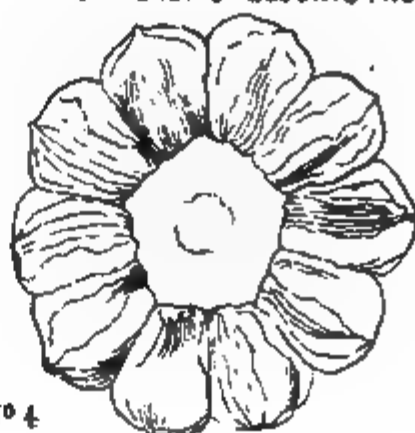
WHITE FLINT DENT
J. W. NICHOLSON, CAMDEN, N. J. SAID TO
COME FROM A CROP OF BLOUNT'S PROLIFIC, 1883

$\frac{1}{4}$ SIZE



No 1

No 4



$\frac{1}{4}$ SIZE



STATE OF NEW YORK.

No. 34.

IN ASSEMBLY,

JANUARY 22, 1885.

REPORT OF PARDONS FROM THE GOVERNOR.

STATE OF NEW YORK :

EXECUTIVE CHAMBER, }
ALBANY, *January 22, 1885.* }

To the Legislature :

The constitution requires that the Governor “shall annually communicate to the Legislature each case of reprieve, commutation or pardon granted, stating the name of the convict, the crime of which he was convicted, the sentence and its date, and the date of the commutation, pardon or reprieve.”

I herewith submit the statement thus required, for the year 1884, and from which it will also appear that the number of applications (original and those renewed), presented for executive clemency was 508; number of cases pending at the close of the year 1883, 211; number of pardons granted, thirty-five; number of commutations granted, twenty-seven; number of cases denied, 308; and the number of cases pending at the close of the year 1884, 349, of which only 134 were ready for action.

DAVID B. HILL.

PARDON.

January 4, 1884. Adam Bellinger. Sentenced May, 1879; county, Herkimer; crimes, burglary and larceny; term, ten years; prison, Auburn.

This pardon was granted upon the recommendation of the Judge who sentenced and the District-Attorney who prosecuted the convict, and at the solicitation of many of the best citizens of the county of Herkimer, who assured me that the prisoner, after his plea of guilty, was instrumental in securing the conviction and punishment of other criminals; that he had always evinced penitence for his offense, and that in their opinion he would, if restored to society, thereafter lead an honest, decent life.

These representations were made from such a satisfactory source that I was led to believe the ends of justice had been sufficiently answered in this case by the imprisonment already suffered.

January 12, 1884. Thomas A. R. Webster. Sentenced May 27, 1881; county, New York; crime, obtaining money by false pretenses; term, one year and six months; prison, Sing Sing.

An appeal was taken in this case and the conviction affirmed. The convict has been in prison six months. The conviction arose out of the sale of certain land, and it was charged that the convict made false representations concerning the same, to induce the complainant to purchase it. He seemed to have been convicted upon the theory that after the deed was prepared, he read it to the grantee, and in so reading the same represented that by the deed the land was located on the north side of a certain railroad, when, in point of fact, correctly read, the description would have located it on the south side of said railroad.

It now appears that, notwithstanding the word "south" was in the deed instead of "north," and, notwithstanding the word "north" may have been incorrectly read aloud from the deed by the prisoner, instead of "south," yet the remaining description and other boundaries contained in the instrument fixed the location of the land on the north side of the railroad; and it is quite clear that any court must have so determined. This being so, the grantee acquired

by the deed exactly the land he bought of the prisoner, which he had inspected, and which he held for two or three years before making complaint.

I had also before me an affidavit of a party not sworn on the trial, but who was present at the time the deed was delivered, by which it appeared that the prisoner did not read the deed aloud to the grantee at all.

Nine of the jurors who convicted him petitioned for his release.

The judge who wrote the opinion in the appellate court, affirming the conviction, in a letter to me, referring to the other parts of the description, which showed that the premises were located on the north instead of the south side of the railroad, wrote :

“If these facts had been presented upon the trial it would have altered the case, and the use of the word south instead of north, in the description, would be immaterial ; and I do not now see how the conviction could be upheld.”

The prisoner's rights seem to have been very badly cared for on the trial, and I was entirely satisfied, after a patient examination of all the facts that his pardon should be granted, with a restoration to citizenship.

January 15, 1854. Henry L. Hay. Sentenced, October 8, 1875 ; crime, rape ; term, twenty years ; prison, Auburn.

I have carefully read all the testimony taken upon the trial, and a mass of letters, petitions and affidavits touching the case, which have been presented to my predecessor and to myself, and have arrived at the conclusion that the convict ought to be pardoned.

The prosecutrix was but eleven years old, and the crime was alleged to have been committed on the fifth day of May, 1875, in the woods, as she was returning to her parent's home from a village not far away. She was accompanied by a younger brother, from whose side she was taken, and who stood near where the offense was committed.

Her testimony is very indefinite and unsatisfactory as reported in the stenographer's minutes of the trial ; but I gather from it she had known the convict, having a few years previously lived near him. It was about a week after the occurrence before she told her parents that she had been ravished, and then stated that she did not know her assailant ; but that he wore sandy whiskers around his face. The prisoner was arrested in July following, upon a warrant issued for a person unknown, but described in said warrant as a man of medium size, with sandy whiskers. In the meantime the prisoner remained in the neighborhood, where the crime was the subject of public discussion. He was very well known to the sheriff who had the warrant, and to the father of the little girl. Before the arrest was made, the girl and her little brother were brought

into the presence of the convict to identify him if possible. The girl, after a little hesitation, said he was the man who assaulted her, but the brother said he was not. Upon the trial the prosecutrix identified the convict, but was very positive that the person who committed the crime was a tall man with long sandy whiskers all around his face. Her brother was not sworn at all. A witness testified that he saw the children pass along the road in the direction of the woods, and that the prisoner was following twelve or fifteen rods behind them, but it appears from the evidence taken on the trial and such as has been produced to me since, that the fact by which this witness fixed the day when he saw the prisoner had no existence.

A witness for the defense testified that she saw the children pass at about the date of the commission of the offense, and a short time after a man following, who was not the prisoner, whom the witness well knew, but who answered the description the prosecution gave of her assailant. Other testimony was given by the last three witnesses, whose character and integrity are abundantly vouched for, which, if true, established an *alibi* for the prisoner. Positive proof was given that the prisoner at the time the offense was committed had no beard, while some witnesses testified that he had.

The prisoner's reputation was not good, and he was impeached on the trial. I am inclined to think this fact had more to do with his conviction than it ought.

But it is not necessary in this case for me to determine that the jury erred in convicting the prisoner upon the proof before them.

It is quite apparent to me that the case was determined against the prisoner upon the finding that he, on the day the offense was committed, wore a sandy beard. No other finding, in my opinion, would support the verdict.

In addition to the testimony taken in court to the effect that on the 5th day of May, 1875, the convict had no beard, I have before me evidence not produced upon the trial, which to my mind conclusively establishes that proposition.

Another fact is most satisfactory. Since he has been in prison his beard has been allowed to grow, and its color proved to be a very pronounced black. This is certified to me by the chaplain of the prison, the judge who sentenced the convict, and who visited him since his incarceration, and by a confidential clerk attached to the Executive Department, who also saw him in prison.

A petition, numerously signed, certifies that it is the opinion of the petitioners and a majority of the people in the neighborhood where the crime was committed, that the prisoner is innocent.

He has now been imprisoned for more than eight years upon a conviction based, as I am satisfied, upon mistaken identity. I am convinced that I should not only release him from imprisonment, but restore him to citizenship.

January 26, 1884. Henry H. Harrison. Sentenced, December 29, 1874; county, New York; crime, robbery in the first degree; term, twenty years; prison, Sing Sing; transferred to Auburn.

This convict is a colored man, absolutely without relatives or friends, who was convicted for robbing a colored woman of fifty cents. He represents that he is a native of Hayti. He had for many years before his arrest been a sailor, and was a stranger in the city of New York, where the ship upon which he was employed had lately arrived.

During his imprisonment his conduct has been such that he has gained the good will and confidence of all the prison officials and they represent him to be one of the best prisoners they have ever had in charge, having given no occasion for the slightest reprimand.

For a number of years he has had charge of the cooking in Auburn prison, and has uncomplainingly and regularly been in the kitchen between three and four o'clock in the morning, where he has worked until about seven in the evening. He seems to have made every possible effort to improve his ignorant condition while in prison, and has gladly availed himself of every means of instruction.

These facts are represented to me as the result of inquiries and an examination of the case made at the prison for my information.

The good conduct of the convict, if maintained, would entitle him to a discharge on the 29th day of April, 1887. The aggregate of extra time he has worked more than the hours of labor ordinarily exacted from convicts by the rules of the prison amounts to about three years and seven months.

It seems to me that the extra labor this friendless man has performed as prisoner, his ready observance of prison rules and regulations, his steady efforts to gain the rudiments of an education and the determination he seems to have formed to hereafter lead an honest life, furnish reasons for his pardon which appeal strongly to the justice as well as the generosity of the State.

February 11, 1884. George C. Crager. Sentenced, September 20, 1882; county, Oswego; crime, bigamy; term, two years; prison, Auburn.

This convict has, by exemplary behavior since his imprisonment, gained the good opinion of all the prison officials, who appear to believe that he is genuinely repentant and determined, when permitted, to regain a good standing in society. By his good conduct he has earned such a deduction from his sentence as would have entitled him to his discharge in the month of May in the present year.

His last marriage, constituting the crime of which he was convicted, was contracted with a highly reputable and Christian young lady, who has, with astonishing love and devotion, maintained her

loyalty to the convict, and who has been the object of extreme sympathy in the community where she lives. A child, the issue of her marriage with the convict, and which seems to have been her only solace and comfort, has just died, and she pleads with me that in her new and dire affliction her husband may be present at its funeral. Many kind-hearted people have interested themselves in her behalf, and join in her petition.

The cases are so numerous in which my duty and obligation to the public constrain me to resist appeals like this, I am glad to believe that, without prejudice to the interests of society. I may, in a substantial way, show my sympathy for this young afflicted wife by releasing to her the short remainder of the term of imprisonment which her husband owes the State.

February 16, 1884. John I. Morau. Sentenced, December 24, 1883; county, New York; crime, assault and battery; term, two months; prison, New York Penitentiary.

This pardon was granted on the following grounds:

It appeared to my satisfaction that the convict, previous to his conviction, had borne a good character, and had been a hard-working man

From an examination of all the surrounding facts and circumstances in the case, I felt constrained to believe that the time already served by the convict had amply answered the demands of justice, and I therefore determined to grant the pardon applied for.

February 19, 1884. Joseph Dunn. Sentenced, September 30, 1880; county, Erie; crime, receiving stolen property; term, five years; prison, Auburn.

This convict, with three other parties, stole a sum of money from a drunken man. He pleaded guilty to complicity in the offense and was sentenced to imprisonment for five years, the longest term which the statute permitted. His companions were sentenced to shorter terms, though, from all the facts I can learn, they appear to have been equally guilty. By good conduct in prison he has earned all the deduction from his sentence which the law allows, and his term would have expired on the 1st day of May, 1884.

I have seen a number of letters which this young man has written to his parents, in which he acknowledges the justice of his punishment, and evinces a determination to lead an honest life upon his discharge. I am impressed with the belief that the reformatory purposes of punishment have been answered in this case. His former employer has written to me that if discharged now he can again enter his service.

In view of all the circumstances, I am of the opinion that the remission of the short time which yet remains of his sentence will have a tendency to encourage him to improve the opportunity afforded to redeem himself from the consequences of his crime.

February 21, 1884. Homer D. Skinner. Sentenced, March 3, 1881; county, Schuyler; crime, arson third degree; term, seven years; prison, Auburn.

An application for the pardon of the convict was denied in June, 1883, but upon a re-examination of the case and a further presentation of facts, I think the prisoner should be released.

Owing to the fact that a number of fires had occurred in the village of Watkins, the trustees offered a reward "for any person detected and convicted of burning a building in the village."

The offer of this reward attracted the attention of a disreputable fellow, not then living in Watkins, but who came there for the purpose of bringing about a state of facts that would entitle him to a share of the reward offered. He found a ready accomplice in the person of a deputy sheriff of the county of Schuyler, and I have no doubt they conspired to create a fire, a culprit, a detection and a conviction for the purpose of obtaining the reward.

Homer D. Skinner, the convict, was a young man, the son of respectable parents, but beyond all parental restraint — an idle, shiftless, intemperate creation of the village groggery — one of a class easily recognizable and far too numerous.

His love of drink and his idle and profitless way of life suggested to the conspirators the ease of making him the culprit. For a number of days he was plied by them with liquor and kept in an intoxicated condition. In the meantime their plans were hardly concealed. Indeed, it now appears that more than one person outside of the conspiracy knew that arson was to be committed, and that the convict was to be accused.

On the night the fire occurred the convict sat in a saloon grossly intoxicated and sound asleep. One of the projectors of the arson, with difficulty, roused him and fairly dragged him, in a stupid, dazed condition, in the direction of the building to be burned. A few moments afterward the cry of "fire" was heard, and the man who conducted the prisoner to the scene, ran away, while the deputy sheriff, from a convenient point of observation, rushed upon the convict and arrested him under circumstances that secured his conviction. I have before me the affidavit of a person to the effect that, at the request of this officer, he helped carry the convict, after his arrest, to the jail, and that he was so much intoxicated they "had to take hold, one on each side of him, and hold him up and partially drag him along to the jail."

In the light of all the facts before me, I have grave doubts as to the convict having set the fire at all. If he did, I am entirely

satisfied that he was not a free moral agent, but the senseless instrument of those who certainly were responsible for the crime.

It appearing to my satisfaction that he became a victim to a wicked conspiracy, through his intemperate habits, I have determined to grant his pardon upon the condition that he wholly abstains from all intoxicating beverages for the term of five years from his discharge.

March 7, 1884. Horace White. Sentenced, April 25, 1883; county, Clinton; crime, burglary, first degree; term, ten years; prison, Clinton.

The convict went to a saloon which he had been in the habit of frequenting in the village of Plattsburgh, about ten o'clock at night, with a companion. Finding the place closed, they raised the window and took from the saloon a few bottles of lager beer of the value of less than fifty cents. The proprietress of the establishment slept in a room above it, and heard and saw the culprits, who, as I understand the case, had at the time some conversation with her, apparently making no effort to conceal their identity.

The young man who was with White pleaded guilty to petit larceny and was imprisoned for a short time in the county jail; but the counsel for the convict advised him to demand a trial, insisting that the transaction was merely a trespass. This course resulted in his conviction of an offense for which the highest penalty was imprisonment for the term of ten years.

The judge who pronounced the sentence, the district attorney who prosecuted the indictment and every member of the jury who rendered the verdict earnestly recommend that the convict be now pardoned. I have no difficulty in arriving at the conclusion that if the conviction was proper, it is peculiarly a case in which the rigors of the law should be tempered and modified by executive clemency.

March 7, 1884. David Murphy. Sentenced, June 27, 1872; county, New York; crime, murder first degree; term, death; commuted August 8, 1873, to imprisonment for life; prison, Sing Sing.

The homicide was committed by a pistol shot, and in the midst of, or immediately following, quite a serious affray, between the convict and the deceased.

An appeal was taken to the General Term of the Supreme Court from the conviction of murder in the first degree, which was affirmed by both of the justices constituting the court, on the grounds that as matter of law they ought not to interfere with the verdict of the jury. Both wrote opinions. The chief justice, after reviewing the facts in the case, concludes his opinion as follows: "But while we think there is nothing in this case to justify this

court in reversing the judgment, "we feel bound to say that we think the clemency of the executive may very properly be exercised in commuting the sentence to such lesser degree as shall be thought proper on a review of the evidence." The associate justice, in his opinion, after commenting upon the evidence, says: "The statute anticipates the infirmities of nature by providing that a killing in the heat of passion, with a dangerous weapon, without intent to kill, shall be manslaughter in the third degree, and this case is one in which that verdict would, I think, have accomplished the ends of justice." And he concludes as follows: "For these reasons I concur with the chief justice that, although we cannot say positively that injustice has been done, the doubt which springs from an examination of the whole case makes the suggestion proper that the executive clemency may safely be employed toward the prisoner."

The assistant district attorney, who tried the indictment for the people, writes: "Upon a review of the case, I am satisfied that manslaughter in the third degree would have been the right verdict in this case. I, therefor, respectfully suggest that the sentence be reduced to what it should have been had that been the verdict of the jury."

The district-attorney himself, who presented the case to the court on appeal, expresses his opinion as follows: "The judges, however, in their opinions, express the belief that while they cannot interfere with the findings of the jury, a verdict of manslaughter in the third degree would have satisfied the requirements of justice, and that the executive clemency might justifiably be exercised in reducing the punishment accordingly. With that view I concur."

Notwithstanding the opinions given above, of those so well qualified to speak of the merits of the case, I have read the evidence, and am surprised that a verdict of murder in the first degree was rendered. The severest punishment which could have been inflicted for manslaughter in the third degree was seven years imprisonment. The crime was committed April 17, 1872, and the convict has been in confinement ever since that day. He has been in prison since August, 1873. During his incarceration his conduct has been irreproachable.

In the year 1878, when a fire occurred in the prison store-house, which afforded him an opportunity to escape, he rendered willing and valuable assistance in saving property belonging to the State. Such behavior should, I think, be recognized and encouraged, and this circumstance may well be considered as an additional reason why the clemency asked in this case should be granted.

March 13, 1884. William Emmerline. Sentenced, May 18, 1883; county, Albany; crime, burglary third degree; term, one year; prison, Albany County Penitentiary.

It is represented to me that the convict's mother has but a short time to live, and it is asked that he may be relieved from the five days remaining of his sentence, in order that he may be enabled to be with her in her last hours.

It is on this, and the further ground that this was the convict's first offense, and of his previous good character, that I have determined to grant the pardon applied for.

April 7, 1884. Edward Jones. Sentenced, August 14, 1879; county, New York; crime, grand larceny from the person in the night time; term, —————; prison, New York State Reformatory.

This convict was arraigned upon an indictment charging him with the offense of grand larceny from the person in the night time. He pleaded guilty to the indictment, and in consideration of his age and previous good character, he was sentenced by the court to the New York State Reformatory. It seems that at the time he pleaded to the indictment, the question was raised that the larceny was committed in the day time. The law was then such that if this offense had been committed in the night, the maximum punishment that could have been inflicted for the same would have been ten years' imprisonment; but if in the day time, the maximum imprisonment would have been but five years. Inasmuch, however, as the court had determined that he should be sent to the reformatory, from which it seems to have been expected that he would be released long before the expiration of either of these terms, the fact that the indictment charged the graver offense was not deemed of much importance. Thus, under his plea of guilty to such an indictment, he was committed to the reformatory for imprisonment and reform. He reached that institution on the 16th day of August, 1879; on the 7th day of June, 1881, he was transferred by the managers of the reformatory to the State prison at Auburn as incorrigible. The effect of this was to consign him to prison for the term of ten years, less the time he had spent in the reformatory. But on the 20th day of June, 1882, having become insane, he was sent to the asylum for insane criminals at Auburn, and on the 18th day of October, 1883, having fully recovered, he was returned to the State prison, where he might be imprisoned for the remainder of a ten years' term.

I have had his case carefully investigated, and there is not the slightest pretext, nor is it claimed in any quarter that the offense to which he pleaded guilty was committed in the night time. On the contrary, the proof is positive that he was arrested immediately after the offense, about two o'clock in the afternoon. The judge who sentenced him writes that if he had sent him to prison he would not have fixed his term of imprisonment longer than four years.

The maximum term for his real offense is five years, and granting him commutation for good conduct while he has been in prison and the asylum, his imprisonment should have terminated on the 25th day of November, 1883.

This furnishes a forcible illustration of the manner in which the merciful intent of the courts may sometimes miscarry when convicts are sent to the reformatory.

I have determined, in pure justice to this prisoner, to grant him the pardon which he asks.

April 24, 1884. Charles Johnson. Sentenced March 5, 1884; county, New York, crime, assault third degree; term, three months; prison, New York Penitentiary.

I have read all the testimony taken upon the trial, and though the case seems to be without much extenuation, the sentence appears to be quite severe.

The wife of the convict is in a delicate condition and entirely destitute of means; a physician's certificate informs me that he deems it very important, in view of her near confinement, that her husband should be released; the judges who sentenced the prisoner express the opinion that the ends of justice will be fully answered by his liberation. I am satisfied that the facts in the case justify me in granting the application for his pardon.

June 9, 1884. John Donohue. Sentenced, May 9, 1884; county, Oneida; crime, assault third degree; term, six months; prison, Albany County Penitentiary.

This pardon was granted upon these grounds:

It appeared to my satisfaction that the prisoner previous to his conviction had been a hard-working, industrious man, and that this was his first offense; that he is a mason by trade, and has a family dependent on him for support; that his only opportunity of employment is during the mild season, and if compelled to serve out the remainder of his sentence, his opportunity of earning subsistence would be lost during the entire year. His sentence was based principally upon the fact of his committing contempt of court after conviction, and which was clearly excessive for the real offense for which he was arrested and convicted, and which was hardly deserved, even taking the contempt into consideration.

His pardon was recommended by the judge before whom he was sentenced, and several citizens of standing and character in the community who were thoroughly conversant with the circumstances of the offense.

It appearing that the convict has been somewhat addicted to the use of intoxicating drinks, this pardon is granted only upon the

condition that the prisoner shall not become intoxicated at any time during the period of one year from and after the date of pardon.

June 24, 1884. Elias N. Crow. Sentenced, May 29, 1884; county, New York; crime, cruelty to an animal, to-wit, a horse; term, six months; prison, New York Penitentiary.

This prisoner pleaded guilty on the 30th day of March, 1881, to an indictment in the General Sessions of the city of New York, charging him with cruelty to a horse. Sentence was thereupon suspended by the court upon the express condition that if the defendant should again violate the provisions of the statute relating to cruelty to animals, he was to be sentenced upon the indictment and his plea of guilty already entered.

The prisoner was engaged in a business which made necessary the use of a large number of horses in drawing trucks, and were let to others to be so used, and he has continued in that business up to the present time.

On the 5th day of May, 1884, he was again arrested, charged with the offense of permitting one of his drivers to use a horse which was suffering from a complaint called the "scratches." On this latter charge he was arraigned and pleaded guilty, and was thereupon sentenced to pay, and did pay, a fine of twenty-five dollars.

He was then, on the 9th day of May, 1884, sentenced upon the plea of guilty, which had been entered on the previous charge nearly three years before, to be imprisoned in the New York Penitentiary for the term of six months.

His pardon is now asked by a large number of citizens of the city of New York of high standing and respectability, who testify in unqualified terms to his integrity and good character, and their application is warmly indorsed by the district attorney and the judge who sentenced him to imprisonment. With these things before me, and believing from other representations, that the condition of the family of the prisoner appeals strongly for his liberation, that his business will be very much damaged, if not destroyed, by his imprisonment for the term of his sentence, and being fully convinced that the incarceration already suffered will prevent any further transgression of the law on his part, I have determined to grant him a pardon.

June 26, 1884. Gerardus Reese. Sentenced June 16, 1884; county, Schenectady; crime, assault third degree; term, two months; prison, Albany County Penitentiary.

It appears that the assault committed by the convict was in no sense aggrieved, and the sentence imposed was out of all proportion to the offense committed. From a careful examination of the papers on file in this case, I am satisfied that the convict, who was unquestionably a sober, hard-working man, has already been sufficiently punished, and I am satisfied that the interests of justice will be subserved by his release at the present time.

July 3, 1884. Thomas Chestnut. Sentenced, July 23, 1879; county, Westchester; crime rape; term, ten years; prison, Sing Sing.

A reading of the most essential parts of the testimony, and conversation with the prosecuting officer, leaves in my mind much doubt whether the offense of rape was committed. After the trial and conviction of Chestnut, a further examination of the case and the character of the complainant seems to have given raise to the same doubt in the minds of the court and district attorney, for at the next term of the court the other parties indicted were permitted to plead guilty to an assault with attempt to ravish, and were sentenced to imprisonment for the terms of four years and six months, and four years respectively. These latter terms have expired.

There is no pretense that there is any difference in the guilt of all the parties concerned in the transaction.

I am entirely clear that this convict should be released. And my duty, I think, is made especially plain since I have before me the petition of every member of the court before which he was tried, and the district attorney who prosecuted him, asking for his release.

August 4, 1884. Frederick Munter. Sentenced, December 19, 1863; county, New York; crime, manslaughter first degree; term, life; prison, Sing Sing.

In a moment of frenzy, caused by drunkenness and jealousy, the convict killed a woman to whom he professed to be devotedly attached and between whom and himself an engagement of marriage existed. As no trial was had, it is impossible to procure the facts attending the homicide with very much detail. It seems, however, that the murdered woman excited the jealousy of the convict to the highest pitch by receiving and encouraging the attentions of other suitors to her favor, and that having indulged heavily in drink, he killed his victim, he claims, while he was unconscious of his acts. It certainly appears that shortly after having regained his senses he surrendered himself to the officers of the law, and on being arraigned pleaded guilty to manslaughter. The crime he committed

was an atrocious one, and I am assuming that there was no legal excuse for the same, nor any circumstances that necessarily mitigated the offense.

But he has now been actually imprisoned more than twenty years. His record for good conduct in prison is most satisfactory, so that if he had been sentenced for thirty-four years, the time allowed him for good behavior would so have reduced his time that it would have already expired.

This convict is a German, having no relatives in this country except a sister.

A petition for his pardon is presented, very numerously signed by many of the convict's fellow countrymen, who have investigated the case, and by a great number of very prominent citizens.

An arrangement has been made under which, if released, he shall have immediate and permanent employment.

In view of all the circumstances, I am convinced that the ends of justice have been answered in his case by the punishment he has already received, and that if he is restored to society he will become a good citizen.

I have determined, therefore, to pardon his crime and release him from imprisonment.

September 4, 1884. Terrence Condon. Sentenced, November 16, 1881; county, New York; crime, manslaughter third degree; term four years; prison, Sing Sing.

The term of this convict would have expired by reason of his good conduct in prison, in any event, November 16, 1884.

I find nothing connected with the commission of the offense or with the trial and conviction which in my opinion would justify me in interfering with this convict's punishment. But I have before me the certificate of the physician attending his father, to the effect that the latter is suffering from consumption in its most advanced stage, and that he will probably not live to exceed a month. This is accompanied by a statement of a clergyman that the father is so low with his disease that he has already been prepared for death, according to the rites of his church. It is further represented to me that his constant desire is to see his son again before he dies.

Upon these facts, I have determined that the State can, without sacrificing the cause of justice, remit the remaining two months and twelve days of this convict's sentence for the sake of administering, perhaps, the last earthly comforts to an almost dying father.

September 4, 1884. Peter Swenson. Sentenced, February 6, 1874; county, Kings; crime, murder second degree; term, life; prison, Sing Sing, transferred to Clinton.

The convict is a Swedish sailor who had been in this country but a few days when he committed the homicide which resulted in his conviction.

His pardon is recommended by the judge who sentenced him and by the district-attorney who prosecuted the indictment. His conduct in prison has been excellent, and the circumstances attending the homicide are such as to satisfy me that he has already been abundantly punished for the offense he committed. The facts, as I apprehend them, so nearly justify the act that, fortified by the opinion of the court and district attorney, I fear that I am doing tardy justice in granting a pardon to this friendless man.

September 15, 1884. Charles H. Rudd. Sentenced, March 1, 1879; county, Oneida; crime, burglary first degree; term, ten years; prison, Auburn.

The following reasons have been filed :

The sentence of the convict's brother was commuted by my predecessor, so that he has been at large some time. I know of no circumstances that distinguish the two cases as to the degree of guilt.

This convict has behaved well in prison, and his release is asked by a large number of respectable citizens who were his neighbors prior to his conviction. The present district attorney of the county where he was tried, from such knowledge of the facts of the case as he has been able to obtain, indorses the propriety of his pardon. In addition I have before me a letter from the physician of the prison stating that his health is very poor, that he has been running down for the last year, that in spite of medical treatment he constantly loses flesh and strength, and expressing fear that he cannot live to the end of his term.

The convict has a family, and I am assured bore a fair reputation prior to his conviction. His original term, with the deduction which he has earned for good conduct, will expire September 3, 1885.

In view of all these facts, I have determined to remit the remainder of his sentence by granting him a pardon.

September 17, 1884. William Blumenauer. Sentenced, March 26, 1884; county, New York; crime, assault, second degree; term two years and six months; prison, Sing Sing.

The offense of this convict consisted in wounding, with an ordinary pocket-knife, the complainant, in the midst of a scuffle, which had been preceded by a violent quarrel.

From statements made by the district attorney, I gather that the complainant, who was a larger and stronger man than the convict, was the assailant, and that, though there was no actual justification for the use of a weapon, the circumstances surrounding the affair mitigated, to a great extent the conduct of the prisoner.

A very large number of his neighbors and acquaintances certify to his quiet and peaceable disposition and industrious habits, and ask that he be released from further imprisonment.

Eight of the jurymen by whom he was convicted joined in the petition for his pardon.

The convict was engaged in the milk business prior to his conviction, and has a wife and a number of children. I am satisfied that this continued imprisonment will result in the destruction of his business, and reduce his family to actual want.

The district attorney who prosecuted him, upon consideration of the facts adduced upon the trial, and those which he has since learned, expresses the opinion that this is a proper case for clemency.

This convict has been in prison nearly six months, and I am satisfied that the ends of justice will be subserved and this offender against the law sufficiently punished, if he be now pardoned.

September 18, 1884. John Cody. Sentenced, October 4, 1882; county, Westchester; crime, rape; term, seven years; prison, Sing Sing.

This convict appears to be without friends to push his application for a pardon, but I am entirely satisfied, upon investigating the case, that the proof of force necessary to constitute the offense was wanting. This is apparent from the evidence of the prosecutrix upon the trial, and from her testimony subsequently given upon the trial of other parties charged with the convict.

The district attorney who prosecuted the indictment frankly writes: "Faking the entire evidence I had, at the time of the conviction, a serious doubt of the guilt of the convict, and still entertain such doubt. So far as I can learn, the previous character of the convict is not good. My doubts arise from the fact that it was not made to appear that sufficient force was used by the convict to constitute the crime."

The judge who sentenced the convict writes: "Had the question of fact been determined by the court, the convict would not have been convicted, and I do not believe the offense charged was committed."

I have no hesitation in granting a pardon to this prisoner, who has, I believe, been unjustly confined for nearly two years, and with the pardon I shall restore him to citizenship."

September 20, 1884. James Larkin. Sentenced March 11, 1879; county, Queens; crime, burglary; term, ten years; prison, Sing Sing; transferred to Clinton.

The conduct of this convict in prison has not been good.

The judge, before whom he was tried, writes that the proof against him was chiefly the testimony of an accomplice, corroborated in some particulars, and that the jury accompanied their verdict with a strong recommendation for mercy. He does not, however, advise a pardon.

The district attorney who prosecuted the indictment represents that the evidence was very conflicting, and upon the whole case he recommends clemency.

He further states that the jury, after being out about two hours, made a written agreement that if the prisoner was sentenced for more than one year they would immediately apply for a pardon, and it was under such circumstances that a verdict of guilty was reached.

A written statement is before me signed by all the jurors, setting forth that they had great difficulty in coming to a conclusion that the convict was guilty, and that the agreement referred to by the district attorney was signed by them.

It is apparent that the condemnation of this convict was the result of a reprehensible bargain by the jurors, and an utter and complete disregard of the important duty which a jury is sworn to perform. When the liberty of a citizen is made to depend upon a traffic or wager in the jury room, concerning the matter in which the court may perform its duty in the manner of sentence, criminal trials become grim travesties of justice.

I regard the verdict of the jury, in this case, as invalid and outrageous, and after an imprisonment, which I deem legally unjust, of more than five years, a pardon is granted to the convict, with full restoration of all his rights, of citizenship.

September 22, 1884. Richard Unger. Sentenced, February 21, 1883; county, New York; crime, burglary third degree; term, three years; prison, Sing Sing; transferred to the State Asylum for Insane Criminals.

This convict is only twenty years of age, and this is his first offense.

A few months since he was transferred to the State Asylum for Insane Criminals, where he now is.

The medical superintendent of that institution certifies to me that his insanity assumes the type of melancholia, and that he is absolutely harmless; that this disease is complicated by advanced and rapidly progressive consumption, and that his condition is one of enfeeblement and emaciation, and he is of the opinion that his case is absolutely hopeless. He further states that he doubts if he can live a month.

It further appears that his family are able to provide him with a good home and suitable treatment.

In view of the above facts, I have determined to grant him a pardon, in order that his mother, who is now waiting for him at the asylum, may take him home to die.

[The above convict died October 28, 1884.]

October 7, 1884. Miles Tunny. Sentenced, July 16, 1884; county, Albany; crime, breach of peace; term, five months; prison, Albany County Penitentiary.

It appears to my satisfaction that this convict's wife now lies dead, and has left two young children totally without protection, care and support; that the community is in favor of his release under the circumstances, and the recorder who sentenced him strenuously urges his pardon on these grounds.

In view of these facts, I have determined to remit the remainder of the convict's term, inasmuch as he has already served nearly three months of his sentence, in order that he may be present at his wife's funeral, and to enable him to care for his motherless children.

November 14, 1884. Robert W. Batting. Sentenced, April 23, 1875; county, Ulster; crime, murder second degree; term, life; prison, Sing Sing.

The crime was committed while the convict was under the influence of intoxicating drink to such an extent as to fully justify the belief that he was unconscious of his acts. This is no actual excuse for his crime, and I am inclined to think that all the palliation that circumstance offered was allowed him by the jury in fixing the grade of the offense. In this particular case, however, I think it proper to consider the convict's condition at the time of the homicide, in connection with the other facts presented upon his application for clemency.

The character of the convict up to the time of his arrest had been fair, and with an occasional over-indulgence in drink, he had been industrious and steady; and he had been regarded by his acquaintances and neighbors as quiet and inoffensive. The petition for his pardon is numerously signed by the best citizens of the locality where he lived and where the crime was committed; and his former employers offer to again take him into their service immediately upon his discharge.

He has a wife and five children whose condition appeals strongly to every humane sentiment.

Since his incarceration his conduct has been most exemplary. He has yielded willing obedience to all prison rules, and has shown a disposition uncomplainingly and submissively to suffer the penalty the law has imposed upon him for his crime.

With but these considerations before me, I might still hesitate to interfere with the action of the jury and the judgment of the court in this case. But the judge who pronounced the sentence earnestly recommends a pardon, and in addition, I have had presented to me the further fact that since the convict's imprisonment, when a desperate and savage assault was made by a number of prisoners upon one of their keepers, the convict, at great personal risk, interfered, and, in all probability, saved the keeper's life.

Such service to the State, and such a disposition to aid in the maintenance of prison discipline, should, in my opinion, be recognized and encouraged. Considering this, and all the other circumstances of the case, I have determined to restore the convict to liberty and to his family. But, because his great crime resulted from his drunken condition at the time of its commission, his pardon is granted upon the express condition that if he again becomes intoxicated the same shall be deemed forfeited.

November 26, 1884. William McGovern. Sentenced, August 14, 1884; county, Onondaga; crime, assault third degree; term, six months; prison, Onondaga County Penitentiary.

The justice before whom the convict was tried represents that the injuries inflicted by the convict upon the complainant were not of a serious nature, and he expresses the opinion that, having served over one-half of his term, the ends of justice will not suffer if the convict is now released.

It further appearing to my satisfaction that the convict's mother has but a short time to live, and that she and her aged husband need his care and support, I have determined to grant the pardon applied for.

November 28, 1884. George Whitherhead. Sentenced, October 17, 1884; county, St. Lawrence; crime, drunkennes and disorderly conduct; term, six months; prison, Onondaga County Penitentiary.

The offense of which the convict was fould guilty was not a serious one, and it further appears that he was never previously charged with or convicted of any crime.

He is young, and the only son of a widowed mother.

A report from the warden shows that his conduct while in confinement has been most exemplary, and the penitentiary physician certifies that he is suffering from consumption, and is at present confined to his bed, having recently had a severe hemorrhage, and he expresses the opinion that he cannot survive if kept incarcerated during the remainder of his term.

For these reasons I have determined to grant the pardon applied for.

December 1, 1884. Thomas Reilly. Sentenced, June 6, 1884; county, Ulster; crime, malicious mischief; term, nine months; prison, Albany County Penitentiary.

This convict was pardoned on the ground that the Attorney-General of the State, in an opinion, held that the sentence imposed by the court was wholly illegal and void.

December 5, 1884. John Bowes. Sentenced, September 13, 1879; county, Wyoming; crime, arson first degree; term, life; prison, Auburn.

The convict was confined in the jail at Warsaw, Wyoming county, awaiting trial upon certain charges for which he had been indicted, when it was discovered that a hole had been burned partly through the side of the cell in which he was incarcerated. It appeared that this was done by means of lighted charcoal, which was drawn over or pressed against the wood in such manner as to destroy its fibre, while precautions appear to have been actually taken by the convict, in this attempt to prevent the destruction of the building. It seems to me to be plainly evident by the direct, as well as the circumstantial evidence adduced upon the trial, that the intention was to make, by means of the burning above described, a breach through which an escape might be effected.

Under a number of decisions of the courts, and as the law then existed, this state of facts did not constitute the offense of arson in the first degree, of which the prisoner was convicted, an element of that crime being an intention to destroy the building set on fire; and when any evidence that such might not have been the motive was given, the jury should have been directed to pass upon the question of intent, finding the prisoner guilty only in case they arrived at the conclusion that his purpose was to destroy the building.

While it appears to me that the evidence negatives the theory that such an intent existed, I am still satisfied that if I am mistaken as to the conclusive force of the testimony in this case, I ought to pardon this convict upon the following statement contained in a letter lately received from the judge before whom he was tried:

"It is now suggested by the friends of the prisoner that the jury would have been justified in finding from the evidence that he set

fire to the jail as a means of securing his escape, and not with the intention of burning down the building, so as to bring the case within the rule as laid down in the case of *The People v. Cotteral*, 18 Johns., 115, where it was held that if the firing was for the purpose of effecting his escape only, that the prisoner was not guilty of the crime of arson. I think, with the friends of the prisoner, that the jury would have been justified in taking that view of the case. I do not recall to mind at this time that the jury was so instructed, and my impressions are that their attention was not called to the rule of law as laid down in the case referred to."

If the evidence was altogether with the prisoner upon the question of intent, as I am convinced, he should not have been convicted; and if the jury were not permitted to consider such evidence as was concededly in the case, tending to the prisoner's advantage upon that question, he was not justly dealt with.

In either view I deem it my duty to release him.

December 17, 1884. Joseph P. Wall. Sentenced, February 18, 1878; county, New York; crime, manslaughter in the first degree; term, fifteen years; prison, Sing Sing.

It appears that the convict, until a comparatively short period preceding the commission of the offense, had borne an exemplary character, had worked steadily at his trade as a confectioner, and had in all things faithfully cared for his family.

For some time prior to the homicide the convict's wife had been in the habit of drinking, and at times became so much under the influence of liquor that she grossly neglected her family.

In time the convict became addicted to the use of drink, and coming home one night in a drunken state and finding his wife lying on the floor in the same condition, as it appeared upon the trial, he attempted to arouse her, and not succeeding, kicked her in such a manner that her death resulted in a day or two. It did not appear that he had the slightest intent to cause her death, or to inflict serious injury.

For this act the prisoner was convicted in the Court of Oyer and Terminer of manslaughter, and sentenced to fifteen years' imprisonment.

He now, in his application from the prison, acknowledges the justness of his sentence, but pleads that he may be released in order that he may be able to provide for his old mother and children, who have been thrown upon charity.

Judge Davis, who imposed the sentence, now writes:

"He was at the time grossly intoxicated, and probably did not intend her death, nor fully apprehend the danger to which his bru-

talities exposed her. Exemplary punishment was imposed because crimes of that nature were very frequent at that time. I have since learned that Wall's general character, with the exception of his addiction to drink, was quite good, and that when sober he was industrious and kind to his family. During the last summer I visited the prison at Sing Sing, and saw and conversed with Wall. I was also informed by the warden that his conduct in prison had been at all times exemplary. He is submissive, industrious and at all times attentive to the duties imposed upon him, and thoroughly repentant of his crime. He manifested great anxiety on account of his mother, who is old and poor, and his three children, now in the care of the Protectory, all of whom need his care and support. His case is one in which a pardon may be properly granted. I therefore unite in recommending your excellency to pardon him."

For the reasons above expressed, I have determined that justice will in no wise suffer, but rather be promoted if the convict's application for pardon be granted.

December 18, 1884. Charles C. Bates. Sentenced, December 13, 1882; county, Delaware; crime, bigamy; term, —; prison, State Reformatory.

As a general rule I have declined to interpose clemency in behalf of inmates of the State Reformatory.

Under the statute governing its organization and management, and the rules made by the board of managers in pursuance thereof, executive clemency in behalf of its inmates should be sparingly exercised.

In the case of this inmate, however, I deem it my duty to order his release.

It appears that at the time of the commission of the offense for which the inmate now lies imprisoned, he was only twenty years of age, ignorant of the consequences of his act, under the influence of liquor, and I am satisfied that he had no intention of violating the laws of the State.

While these considerations do not, perhaps, furnish reasons why the inmate should be entirely excused from the consequences of his act, yet they do unquestionably give ground for a mitigation of his punishment.

He has a wife and child, who have, since his incarceration, been provided for by the charity of his father, and furnished a home in the latter's family.

It now satisfactorily appears that further imprisonment of the inmate will be likely to result in a permanent separation between him and his wife, and a dissolution of all family ties, which it is so important should be maintained in their integrity; and it is conceded that the inmate is both able and willing to provide for his family.

I am satisfied that further imprisonment will be of no advantage to the inmate nor to the community.

As a further reason for the inmate's release, I have before me the letter of the judge who imposed the sentence, in which he says:

"Under the statute I felt called upon to send him to the Reformatory. If the court had been called upon to fix the term of imprisonment, it would not have exceeded one year, under all the circumstances. If that had been done he would now have been entitled to his discharge. It does not seem that the ends of justice will be promoted by his further confinement."

The inmate has already been actually incarcerated for a period of over two years, an ample punishment for the offense committed, under all the circumstances surrounding it.

December 19, 1884. Harvey J. Totten. Sentenced, December 17, 1883; county, Livingston; crime, grand larceny in the second degree; term, two years; prison, Auburn.

This convict was convicted in the county of Livingston of the crime of grand larceny in the second degree, in having misappropriated funds in his capacity as agent of a sewing machine company, and sentenced December 17, 1883, to two years' imprisonment in Auburn prison.

I am exceedingly averse to interposing clemency in behalf of those who, acting in a fiduciary capacity, violate the trust reposed in them.

In the case of this convict, however, there seems to be sufficient ground for a mitigation of his punishment.

It is now represented to me by the convict's friends that previous to his conviction he had borne a good character; that his family are now destitute by reason of his imprisonment, and that the company was fully indemnified for the misappropriation, by reason of a bond given by the convict, with sufficient sureties.

The district attorney who prosecuted the indictment now writes:

"I believe the punishment already received sufficient, and that the public will not be injured by immediate clemency."

And the judge who imposed the sentence says:

"The court very reluctantly sentenced him to State prison. Convict is of a respectable family. I knew his father well. The punishment the court was compelled to impose is out of all proportion to the offense of which he was guilty, within the meaning of the Code. I think he ought to be pardoned."

The convict having already served over a year's actual imprisonment, I believe the ends of justice have been fully answered in his case.

December 19, 1884. George Lewis. Sentenced, December 6,

1883; county, Queens; crime, larceny; term, two years; prison, Kings County Penitentiary.

The crime consisted in the convict having taken the horse and buggy of a friend, driving off with them to a distant town, and endeavoring to dispose of the same at a low price, under what appeared to be suspicious circumstances. His former employer certifies that he heard the owner of the property repeatedly urge the convict to sell the same, and that he believes he had no intention of committing a crime.

As grounds for his pardon, I have before me the petition of the jurors who convicted him, who say:

"While we could not conscientiously acquit, we feel that the circumstances fully warrant a commutation of sentence."

The district attorney who prosecuted the prisoner now writes:

"I feel that he entirely lacked the elements of which criminals are made; he looked to me like a weak young man, one easily influenced. I am of the opinion that executive clemency may be the making of him, and concur in the judge's opinion."

The latter says: "I gladly unite in the application of the jury. The evidence showed that up to the time of the offense he was a person of good conduct and upright character. He had become addicted to intoxicating liquors to excess, and was in a drunken spree when he committed the theft. The sentence, which was the lowest I could impose, I think should be commuted to one year. Even six months would be sufficient. Such an act would probably save him for all future time."

His former employer now writes that he has full confidence in him, and that should he be released he will immediately take him into his employ.

As the convict has already served over one year's actual imprisonment, I have determined, in view of the reasons above set forth, to grant the pardon applied for.

COMMUTATIONS.

January 5, 1884. Thomas Kearns. Sentenced, March 2, 1883; county, Rensselaer; crime, petit larceny; term, one year and \$150 fine; prison, Albany County Penitentiary.

Sentence commuted to one year's imprisonment in the Albany County Penitentiary, from March 9, 1883.

This commutation is granted on the following grounds:

It appears that the prisoner was convicted on his plea of guilty of stealing a carcass of mutton, valued at four dollars, in the day time and in the presence of a number of people, and that it was the first offense of which he had been charged or convicted.

The police justice before whom he was convicted stated that he had been sufficiently punished for the particular offense of which he was charged, and he would be satisfied if his sentence were commuted.

The county judge and district attorney recommend executive clemency. It is also recommended by a number of respectable citizens.

Taking these facts into consideration, and also the fact that his parents are old and need his earnings, I have determined that justice will not miscarry if the fine imposed is remitted.

January 8, 1884. James Gilmartin. Sentenced, May 23, 1882; county, Orange; crime, assault with intent to kill; term, two years; prison, Albany County Penitentiary.

Sentence commuted to one year, seven months and thirteen days actual time in the Albany County Penitentiary.

This commutation is granted upon the following grounds:

It is urged that the prisoner be liberated in time to attend the funeral of his father, who, it appears upon unquestionable authority, died the day previous to the date of this commutation.

The term of the prisoner would have legally expired within sixteen days by reason of good conduct in prison.

Taking these facts into consideration, and that his antecedents are entirely respectable, I have no hesitation in granting the relief sought by a commutation.

February 2, 1884. Donato Magaldo. Sentenced, February 23, 1869; county, New York; crime, murder in the second degree; term, life; prison, Sing Sing; transferred to Clinton.

Sentence commuted to twenty-five years from February 24, 1869.

This convict was convicted of murder in the second degree for a homicide, committed with a knife.

The testimony taken upon the trial, which I have carefully read, indisputably discloses the fact that the person killed crossed the street to the place where the convict was quietly standing, and engaged in an altercation with him, the two being entire strangers to each other. A number of witnesses testified that the deceased was making threatening demonstrations towards the prisoner, which would seem to justify him in supposing that he was in danger of bodily injury at the time the fatal blow was struck, and about an equal number of witnesses gave evidence that the deceased had turned away and was leaving the prisoner when he was stabbed. The jury seemed to believe, as they had the right to do, the latter version of the occurrence.

The convict is an Italian, and has a family in Italy. At the time of the homicide he had been in this country but a short time, and when he was tried was entirely ignorant of our language.

I have before me a certificate of the chief officer of the Italian municipality where he lived, to the effect that during his residence there he lived a blameless life; and on his trial evidence was given of his good character since he came to this country.

A number of years ago the officers of the prison where he is confined joined in a petition for his release, stating that his conduct in prison had been most exemplary, and a report just received represents that his conduct continues to be satisfactory.

A distinguished judge of the Court of Appeals, who, with a knowledge of the language of the convict and his Italian witnesses, heard these statements before the trial, and who has since read the evidence, asks for a pardon, and says that he is convinced "that the case is a proper one in which to ask executive clemency." In 1881 the district attorney of New York county, after an examination of the case, wrote: "I venture to suggest, however, that the imprisonment which the defendant has already suffered, is, under all the circumstances, sufficient punishment for the crime."

Previous application for this man's pardon have been made to my predecessors, and refused. It seems that in 1872, while such an application was pending, information was asked by the Governor, of the Superintendent of Police in New York, as to the character and antecedents of the prisoner. A report was made by a so-called detective to his chief, which was forwarded to the executive, in which the following statement appears: "As to the character of Donato Magaldo previous to the above offense, I have made an investigation, and find that he was known to the police as a very bad and dangerous man, and had been arrested for a similar offense pre-

viously. Captain Kennedy of the Sixth precinct, says he had known him for some years previous, and that he was a very bad and dangerous man, having been arrested for a felonious assault and battery some four or five months previous to above offense, but for some reason he never was brought to trial."

The above statement is now thoroughly impeached by the proof upon the trial, and an official certificate presented to me, duly authenticated, from the native land of the convict, by which it appears that he left there with his passport for New York, in March, 1867.

This feature of the case is adverted to as demonstrating the injustice that may be done by the representations of police officers lacking in character and conscience.

The crime of which the prisoner was convicted was committed with a weapon, the possession of which has prejudiced in my mind his application. I will not grant him the pardon he asks, but, in view of all the circumstances, I have determined to commute his sentence to imprisonment for twenty-five years, with the usual deduction for good behavior. If he continues to behave himself well, he will be entitled to his discharge on the 23d day of May, 1884.

March 4, 1884. Charles Wilhelm. Sentenced, January 15, 1880; county, New York; crime, forgery third degree; maximum term, five years; prison, State Reformatory; transferred to Auburn January 19, 1880, as an "old convict."

William Anspeke. Sentenced, March 13, 1879; county, New York; crime, forgery third degree; maximum term, five years; prison, State Reformatory; transferred to Auburn August 3, 1882, as "an incorrigible."

Frank Leonard. Sentenced, June 7, 1879; county, Tompkins; crime, burglary and larceny; maximum term, five years; prison, State Reformatory; transferred to Auburn October 30, 1882, as "an incorrigible."

Henry Wilson. Sentenced, April 21, 1879; county, New York; crime, petit larceny from the person; maximum term, five years; prison, State Reformatory; transferred to Auburn October 30, 1882, as "an incorrigible."

James Watson. Sentenced, October 19, 1881; county, New York; crime, attempting to commit petit larceny from the person; maximum term, two years and six months; prison, State Reformatory; transferred to Auburn January 8, 1883, on account of having been previously convicted.

Wallace Bell. Sentenced, May 14, 1879; county, New York; crime, grand larceny; maximum term, five years; prison, State Reformatory; transferred to Auburn January 8, 1883, as "an incorrigible."

These convicts having been originally sentenced to the New York State Reformatory, no limit was fixed by the courts to the term of their imprisonment. But by the provisions of the statute relating to this institution such convicts may be discharged by the managers,

under certain conditions ; and, in case the discretion thus vested in the managers is not exercised, convicts committed to the reformatory may be imprisoned therein for the longest term provided by law as a punishment for the offense of which they were convicted.

Of course, the intention of the law was that persons convicted of crime, whose youth or freedom from criminal habits and associations gave promise of reformation, should not be classed and kept with old and hardened criminals, but should be committed to the reformatory, where they might receive instruction and encouragement, and that their discharge within the limit which the law had fixed for their crime should be dependent upon the progress they made towards reformation.

But it is also provided that the managers of this institution may, in certain cases, transfer prisoners to a State prison where, unless they are recalled to the reformatory, they are kept the balance of the longest term for which they might have been sentenced to prison.

This I consider entirely wrong. If a convict is to be confined in a State prison the criminal courts should fix his term ; and the discretion which may be, in such cases, exercised by the courts, should not be abridged nor vested in the managers of the reformatory.

And, to add to this injustice and this anomalous method of administering the criminal law, it has thus far been held, I believe, that the provisions of the statute relating to reduction of a prisoner's term for good conduct, does not apply to such convicts as are transferred from the reformatory to the prisons.

The result is that an old offender, of previous bad character, is frequently sent to prison by the court for a term much less than the longest time allowed by law and through good conduct in prison can earn a considerable commutation of his sentence ; while a young man, convicted of his first offense, with good character and respectable surroundings, sent by the court to the reformatory for imprisonment and reform, may be doomed by the managers of this institution to finish the longest term which his offense permits, in the State prison, with no commutation for the most exemplary conduct.

The least that should be done for convicts transferred under the present law from the reformatory to prison is to allow them, for good conduct in prison, the same commutation on the remainder of the term for which they might be confined, dating from the day of their transfer, that they would be entitled to if that was the beginning of an original sentence to prison. I think the statute in relation to commutations for good conduct in prison permits this. If it does not it ought to, and I am glad that I have the power, in any event, to rectify such wrongs, by the interposition of a special commutation.

The conduct of the six convicts above mentioned, so transferred from the New York State Reformatory to Auburn prison, is reported by the warden of the latter institution to be good.

Making the deductions from their terms, which I believe them to have earned, all are now entitled to be discharged except two, whose terms under the rule adopted will respectively expire on the sixth and eighth days of the present month.

I cannot now do what I regard full justice to all these convicts, but I have determined to approximate it as nearly as possible by commuting their terms to the eighth day of March, 1884, which is probably as early as the necessary documents can be perfected and forwarded.

March 27, 1884. Edward Feeney. Sentenced, December 27, 1880; county, Niagara; crime, robbery first degree; term, ten years; prison, Auburn.

Sentence commuted to imprisonment in Auburn prison for the term of five years, from December 28, 1880.

This convict was charged with, and convicted of, the crime of robbery in the first degree, together with John Shine, and the circumstances of the offense and the degree of guilt were precisely similar in each case. On November 16, 1883, the sentence of Shine was commuted by me to imprisonment for the term of five years, upon oral representations made to me by the district attorney who prosecuted the indictment, and upon the recommendation of the judge who passed the sentence and numerous other respectable citizens who were familiar with the circumstances of the offense. An application having been made for executive clemency, and in order, therefore, that equal justice may be done, I have determined to commute the sentence of this convict to a like term of five years, which, if his conduct continues good, will entitle him to be discharged July 27, 1884.

April 11, 1884. Angenette B. E. Haight. Sentenced, February 25, 1884; county, Madison; crime, murder in the first degree; term, —, to be executed April 18, 1884.

Sentence commuted to imprisonment in the Onondaga County Penitentiary, for the term of her natural life.

I have examined the facts in the case and have no doubt of the justice of her conviction. The sentence of death necessarily followed such conviction under the provisions of the criminal law.

While there is naturally a feeling of repugnance against the execution of a woman, I am by no means satisfied that in the present condition of the law, which prescribes the punishment of death for murder in the first degree, females should be exempt from

such punishment solely on account of their sex. But in this particular case, having made a full investigation of the condition of the condemned, I find that she is advanced in years, and a report of a medical examination, made by my direction, discloses that her bodily ailments and infirmities are such that it is quite likely that her life will not be of long duration in any event.

I have determined, therefore, to commute her sentence of death to imprisonment for life.

May 1, 1884. Wallace L. Darbee. Sentenced, May 8, 1879 ; county, Erie ; crime, rape ; term, twelve years ; prison, Auburn.

Sentence commuted to four years, eleven months and nineteen days actual imprisonment, which will terminate May 5, 1884.

This convict, at the time of his conviction, was concededly in poor health. His long incarceration has aggravated the malady from which he was suffering, necessitating his removal to the hospital. The prison physician expresses the opinion that it is not unlikely that fatal results may soon be expected unless some change in his surroundings are given.

It is on this, and the ground of the long sentence imposed, and which the district attorney himself, who prosecuted the indictment, deemed excessive, taking all the facts and surrounding circumstances into consideration ; and it further appearing to my satisfaction that all reformatory objects of the prisoner's punishment have been fully accomplished, I deem it my duty to interpose clemency in this case.

May 3, 1884. John B. Griffin. Sentenced, March 17, 1884 county, Dutchess ; crime, murder in the first degree ; term, ——— to be executed May 9, 1884.

Sentence commuted to imprisonment in Sing Sing prison for the term of his natural life.

The condemned was, with two other parties, indicted for murder in the first degree. The homicide was committed by the means of a cartridge of dynamite, which was thrown through the window of a house in which were the deceased and several others. It is quite clear that the motive for the crime was a feeling of revenge towards one or more of the occupants of the house because of information which had been furnished of the commission of another offense by the parties indicted. Of the three, Griffin, the first one tried, was convicted of murder in the first degree. A day afterward, and at the same court, one of the other indicted parties was tried, and upon the same evidence was convicted of murder in the second degree and thereupon sentenced to imprisonment for life. The last of the three

accused of the crime then pleaded guilty of murder in the second degree, and was also sentenced to imprisonment for life.

There is not a particle of difference in the guilt of these three men. It is conceded that Griffin did not, with his own hand, throw the explosive into the house, but that it was done by one of his companions. This circumstance, while it does not palliate his participation in the crime, certainly does not aggravate it. The judge before whom the trial was had, and the district attorney who prosecuted the indictment, joined in advising me that, in their opinion, the same punishment should be meted out to all these convicted men. A large number of citizens ask that the punishment of the only one of them sentenced to death be commuted to imprisonment for life.

There is here presented a notable illustration of the infirmity of all human laws for the punishment of crime, and the necessary imperfection of their administration. The difference between life imprisonment and death as penalties for violated law is immeasurable. And yet, on the same facts, the life of one criminal is forfeited by the verdict of a jury, and the next day another is spared by the same instrumentality.

I consider this a case in which it is my clear duty to commute the sentence of death to imprisonment for life.

May 16, 1884. Abraham Meyers. Sentenced, April 19, 1877; county, Monroe; crime, robbery in the first degree; term, twenty years; prison, Auburn.

Sentence commuted to seven years and one month, actual imprisonment in Auburn prison, from April 21, 1877, which will end May 20, 1884.

This convict has already served within a day or two a full term of eleven years, allowing the commutation, which he has earned for good conduct in prison, a term which, in the opinion of the district-attorney who prosecuted the indictment, is amply sufficient for the offense committed. This ex-official says that he now believes the time has fully arrived for the release of this convict, and that he is enabled to say that the judge who pronounced the sentence had, previous to his decease, expressed the opinion that a considerable reduction of sentence should be allowed the prisoner. It is represented that the convict is advanced in years and in feeble health, and that further imprisonment, in his present condition, would result in unnecessary hardship. The convict has near relatives living in the west, who are both able and willing to provide him with a home for the remainder of his life, and to which he is to be removed upon his discharge from prison. In view of all the circumstances, I am fully satisfied that the vindication of the law does not require this convict's longer imprisonment.

May 20, 1884. Thomas Waldron. Sentenced March 31, 1883; county, Erie; crime, assault second degree; term, five years; prison, Auburn.

Sentence committed to one year and five months in Auburn prison, from April 3, 1883.

This convict was convicted of an assault upon a young girl with an intent to ravish. He was a teacher in a school for boys in the city of Buffalo, and prior to his accusation had the esteem and confidence of all who knew him. It is claimed that he is innocent of any crime, and that the evidence produced against him was entirely untrustworthy, and affidavits have been presented to me tending to establish the latter proposition. After an examination made under my direction, by an agent specially employed for that purpose, I am not satisfied that the convict is free from guilt; but such examination has brought to light certain facts which the rules of evidence excluded upon the trial, but which I think are properly submitted upon this application. Upon a careful consideration of the testimony upon the trial and after giving due weight to the facts, which such subsequent examination has developed, I am so impressed with doubt to the convict's guilt of the crime for which he was sentenced, that I have determined to interpose in his behalf. I cannot grant the pardon asked for, because I am satisfied that he was guilty of indecent assault, or, as it is now termed in the law, an assault in the third degree. If he had been convicted of this offense, he might, as a maximum punishment, have been imprisoned for the term of one year, or been sentenced to pay a fine of \$500. The character of this offense, and the circumstances attending its commission, are such as to render it difficult to avoid strong prejudices against the convict. But I conceive it to be an important duty of the executive to exercise clemency when he believes that justice has miscarried. And I apprehend, if his conscience is satisfied in a given case, that is all he needs to justify his conduct, since he alone is responsible for the proper use of this extensive and delicate power. This convict has been imprisoned more than a year. I have determined to commute his imprisonment to one year and five months. This with continued good conduct on his part, in prison, will entitle him to a discharge on the 7th day of June, 1884.

May 29, 1884. Don Child. Sentenced, January 27, 1882; county, New York; crime, false pretenses; term, three years and \$250 fine; prison, Sing Sing.

Sentence commuted to two years and four months actual imprisonment in Sing Sing prison, from January 23, 1882.

It appearing to my satisfaction that the court in imposing sentence was misled as to the degree of guilt of the parties concerned in the commission of the offense, and in giving the convict the same sentence as was imposed upon his associates, on the theory that he was equally guilty, I have determined to relieve him of the fine which

was imposed, in addition to his term of imprisonment, in order that his punishment shall be more in accordance with what seems to have been his degree of guilt.

June 23, 1884. Thomas Boland. Sentenced, December 5, 1879; county, New York; crime, violation of the election law; term, two years; prison, Sing Sing.

Sentence commuted to imprisonment in Sing Sing prison for the term of one year and six months from March 27, 1883.

This convict was indicted with one Hall for a violation of the election laws, and upon conviction therefor was sentenced to the State's prison at Sing Sing for the term of two years. His co-defendant, Hall, on a like conviction before another judge, was sentenced to be imprisoned in the same prison for the term of one year and six months. They both entered upon their terms of imprisonment on the same day. By good conduct in prison they have both earned the reduction of sentence allowed by law, and Hall will be entitled to his release on the 26th day of June, 1884.

An application was made to me some months ago for the pardon of Boland, based upon a previous good character, and certain circumstances connected with the condition of the family, which appealed strongly to my sympathy; and the judge who pronounced his sentence joined in said application. I could not see my way clear to grant the pardon asked for; but I examined the cases with great care, and it must be acknowledged that there is not a particle of difference in the criminality of the two convicts. My conclusion was to commute the sentence of Boland to one year and six months, being the same term for which Hall was sentenced. This will entitle him to his release, if his conduct continues good, with Hall, on the 26th day of June, 1884. That date being now near at hand, I have forwarded to the prison the papers necessary to carry out this purpose.

September 11, 1884. Cornelius Driscoll. Sentenced, November 23, 1883; county, Albany; crime, assault first degree; term, two years; prison, Albany County Penitentiary.

Sentence commuted to imprisonment in the Albany County Penitentiary for the term of one year, from November 26, 1883.

The petition for the convict's release was presented by the president of the village and various other town and village officers. I am informed by the judge who sentenced him that he was the least aggressive of those concerned in the commission of the offense, and he expresses the opinion that the application, in view of the condition of his wife and family, is entitled to generous consideration. His imprisonment has left his wife with no means of providing for

a number of children but her labor, aided by public charity. My investigation of the case has led me to the conclusion that the ends of justice will be answered by a commutation of the sentence of this convict to one year. This, with continued good behavior on his part in prison, will entitle him to his discharge on the 21st day of September, 1884.

September 11, 1884. Charles Taschenbrecker. Sentenced, February 14, 1881; county, Erie; crime, robbery; term, ten years; prison, Auburn.

Sentence commuted to five year's imprisonment in Auburn Prison, from February 16, 1881.

This convict, with two others, was jointly indicted for robbery in the first degree. His companions offered to plead guilty to a lesser offense, which was accepted, and each received short sentences, which have long since expired. The court would have been willing to receive a similar plea from the convict, but his counsel refused to allow him to plead guilty to such offense, and he was thereupon convicted of the crime charged in the indictment. It appears to my satisfaction that the previous character of the convict has been good, and that he had been a hard working young man. It was also shown that he was no more guilty than his companions. The judge and district attorney unite in asking that his sentence be commuted, as a matter of justice, to a term of five years, and I am entirely satisfied that this should be done. If his conduct continues good, he will be entitled to a discharge September 15, 1884.

September 15, 1884. Frank Jelly. Sentenced, May 26, 1868; county, Chautauqua; crime, arson, five indictments; terms, seven, four, four, seven and seven years, respectively; prison, Auburn.

Sentence commuted to twenty-six years and ten months imprisonment from June 2, 1868.

At the time of his sentence the convict was quite young, and undeniably of weak intellect, easily influenced by bad associates and surroundings.

It is now claimed that he is not guilty of all the charges to which he pleaded guilty, but I do not purpose to base my action in his case upon that allegation.

He has been in prison more than sixteen years. His conduct during that time has been exceptionally good, and he has exhibited the most encouraging symptoms of contrition and evinces a determination to improve himself in every way.

His father is quite aged, and since his son's imprisonment he has removed to the city of Chicago. His condition in life is such that instead of being able to care for his son, he needs the latter's assistance.

My information has led me to believe with the judge who sentenced the convict, that "if a person could be found who would care for and influence him, he might be properly set at liberty."

I have corresponded with a humane citizen of Chicago, whose standing is an abundant guaranty that his assurances will be carried out, who has agreed that if the convict is released and sent to that city he will provide him with employment and have a supervision over him.

I am so convinced that under this arrangement the convict will become a good and valuable citizen, that I have determined to commute his sentence to twenty-six years and ten months. This, with continued good conduct on his part, will entitle him to a discharge on the 26th day of the present month, prior to which time the plan for his care and employment above referred to can be perfected.

December 16, 1884. Samuel Casper. Sentenced, April 19, 1877; county, Monroe; crime, robbery in the first degree; term, fifteen years; prison, Auburn.

Sentence commuted to twelve years, from April 21, 1877.

The offense of which these prisoners were convicted was robbery. The circumstances attending the commission of the crime were such as well might arouse indignation, and I am not inclined to find fault with the verdict of robbery, though the evidence might better have supported the charge of larceny from the person. The affidavits which have been presented to me, tending to show that the prisoners did not commit the crime, fail to satisfy me that any mistake was made in their conviction.

But Brown, I am informed, is now more than sixty years of age, and Casper was, at the time of the commission of the offense, a young man, undoubtedly led into the crime by his older companions, and concededly the least guilty of all.

The conduct of the convicts in prison has been good.

Abram Myers, who was sentenced at the same time for the same offense, was, by commutation of sentence released from imprisonment a number of months ago.

I cannot pardon these convicts; but because their companion has been released, and because I am satisfied that the ends of justice have been answered by the imprisonment already suffered, I have determined to commute the sentences of each to the term of twelve years.

This with continued good conduct on their part, will entitle them to be released on the 20th day of December, 1884.

These reasons apply to the case of Herman Brown — the next commutation following.

December 16, 1884. Herman Brown. Sentenced, April 19, 1877; county, Monroe; crime, robbery in the first degree; term, eighteen years; prison, Auburn.

- Sentence commuted to twelve years, from April 21, 1877.
For reasons see case of Samuel Casper, next preceding.
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December 18, 1884. William A. Stone. Sentenced February 27, 1874 ; county, Madison ; crime, arson in the first degree ; term, life ; prison, Auburn.

Sentence commuted to seventeen years and six months' imprisonment in Auburn prison, from February 27, 1874.

These convicts were sentenced to imprisonment for life upon a conviction of arson in the first degree, in the county of Madison.

Stone was sentenced on the 27th day of February, 1874, and Woodford on the third day of March in the same year.

The offense consisted in setting fire to an old shed, which communicated with adjoining buildings, causing the destruction of a large amount of property, including a number of dwelling houses.

The convicts were intelligent young men, respectably connected, and up to their arrest for the offense of which they were convicted, they had neither of them ever been suspected of crime. I am unable to gather from the evidence that any such motive existed in the minds of the convicts as usually leads to the perpetration of an offense of this character.

But it clearly appears that for some time prior to the arson, these parties had been much addicted to intoxicating liquor, and were almost constantly together in shiftless drunkenness. From a position of respectability, which entitled them to the esteem of all who knew them, they gradually sank to a condition where their lives were aimless and useless. In this plight, it needed but the recklessness of intoxication to lead them thoughtlessly, and with no care for consequences, to commit the offense. I have never known a case where indulgence in drink was more completely and exclusively the cause of crime.

The contrition and penitence of these convicts, and the representations of their reputable friends and neighbors, who, with an unanimity very unusual, ask for their release, and express their belief that if permitted they will again become reputable and useful citizens, together with my belief that the influence of good early training and surroundings will reassert itself, incline me to extend clemency to these prisoners. And this course is earnestly recommended by the judge who sentenced, and the district attorney who prosecuted them.

I have determined to commute the sentence of each of the convicts to seventeen years and six months, which, with continued good conduct, will terminate the imprisonment of Stone on the 11th day of January, 1885, and of Woodford on the eighteenth day of the same month.

This commutation is granted, however, upon the express condition that the convicts shall each, hereafter, entirely abstain from drinking intoxicating liquors, and in case said condition is violated, their sentences shall be restored and revived in full force and effect.

These reasons apply to the case of Melvin D. Woodford — the next commutation following.

December 18, 1884. Melvin D. Woodford. Sentenced, March 3, 1874; county, Madison; crime, arson in the first degree; term, life; prison, Auburn.

Sentence commuted to seventeen years and six months' imprisonment in Auburn prison, from March 4, 1874.

For reasons see case of William A. Stone, last preceeding.

December 19, 1884. Patrick Nicholson. Sentenced, October 23, 1868; county, New York; crime, murder in the second degree; term, life; prison, Sing Sing.

Sentence commuted to thirty years' imprisonment in Sing Sing prison, from October 27, 1868.

This convict, under advice of counsel, pleaded guilty to the crime of murder in the second degree, and was sentenced October 23, 1868, in the Court of Oyer and Terminer, in the county of New York, to imprisonment in State prison for the term of his natural life.

The prosecuting attorney, in a communication on file in this department, writes that it is not entirely certain that the prisoner would have been convicted of any higher crime than manslaughter in the third degree, had he stood trial and been properly defended. While this opinion of the prosecuting officer throws some doubt upon the justice of the conviction, yet, on this ground alone, I am unwilling to interpose clemency in his behalf.

It is now urged, however, by the friends of the convict, that he is an old man; that his long term of sixteen years already served, in addition to his concededly previous good character, together with his uniform good behavior in prison, and his services to the State in promoting discipline and quelling disturbance, entitle him to some consideration at the hands of the Executive.

As to the claim of his having rendered important services to the State, I have before me a certificate from one of the principal officers of the prison, in which he says that the convict rendered important and special services in frustrating the attempt of certain desperate burglars to escape in 1875, and that he prevented a further escape in 1881, involving three professional criminals. He further states that the convict has often checked unruly impulses in his fellow-convicts, that he has always been found to be obedient, efficient and faithful

in the trust reposed in him, that his influence has always been exerted in the interest of good discipline, and that his record is without a single black mark.

For the reasons above stated, I have determined to commute his sentence to the term of thirty years, with the usual allowance for good conduct, which, if his behavior continues to meet the approval of the prison officers, will entitle him to be discharged December 22, 1886.

December 20, 1884. Michael McCarty. Sentenced, December 14, 1881; county, Montgomery; crime, stoning a railroad train; term, five years; prison, Clinton.

Sentence commuted to four years' imprisonment in Clinton prison, from December 20, 1881.

This prisoner, who appears to be friendless, makes his application from the prison, and sets out that he purchased a ticket to make a journey upon a railroad; that when he got upon the train he was very much intoxicated, and so stupid that he did not know what he was about; that upon his ticket being demanded, he, not understanding what was wanted, refused to pay his fare, for which he was ejected from the train, and that at what he supposed to be an indignity, and in his anger at the conductor by whom he was ejected, threw a stone at the train.

In answer to an official inquiry, the district attorney says that he is inclined to think that the sentence was about twice as long as it should have been, and that this was pretty generally the sentiment of those who heard the trial.

The judge, in his communication, states that though the convict had a ticket, he thinks he did not realize that he had it; that probably the convict was not as bad as he supposed; that his intoxicated condition led him into the commission of the crime; that if he has shown due penitence and his conduct in prison has been good, law and justice will be satisfied with the punishment already imposed.

In view of the above statements, the fact that he received the full penalty of five years for his offense, and his good conduct in prison, as appears by the certificate of the warden, I am led to believe that justice will be fully answered by a commutation of the prisoner's sentence to four years, which, if his behavior continues to meet the approval of his keepers, will entitle him to be discharged at an early day.

December 20, 1884. Anthony Mahn. Sentenced, May 17, 1867; county, New York; crime, murder in the second degree; term, life; prison, Sing Sing.

Sentence commuted to thirty years' imprisonment in Sing Sing prison, from May 18, 1867.

At the time of his conviction he was quite young, only about nineteen years of age.

The fatal act resulted from a street quarrel, in which were engaged several persons other than the convict and deceased. It is entirely clear that while the circumstances connected with the transaction do not furnish a justification for the convict's act, yet they do disclose such provocation as to present to my mind a mitigation of his offense.

The district attorney who prosecuted the indictment writes: "The facts, in my judgment, present manslaughter in the third degree."

It appears that deceased and convict had never met before, and the judge who imposed the sentence charged that the assault was not made with intent to cause death.

From the papers on file it appears that the prisoner's previous character was good, and that this was his first transgression of the law.

The officers of the prison where convict has been confined certify that his conduct, at all times, has been most exemplary.

In view of all the facts and circumstances surrounding this case, and of the opinion of the prosecuting officer, I have determined that the ends of justice will be fully answered by commuting the sentence of this convict to thirty years, with the usual allowance for good conduct, which, if his behavior continues to meet the approval of the officers of the prison, will entitle him to be discharged July 17, 1885.

STATE OF NEW YORK

No. 35.

IN ASSEMBLY,

JANUARY 28, 1885.

ANNUAL REPORT

OF THE CONRAD POPPENHUSEN ASSOCIATION.

COLLEGE POINT, QUEENS CO., N. Y.,
January 19, 1885.

To the Honorable the Legislature of the State of New York:

In pursuance to section 16, chapter 667 of the Laws of the State of New York, passed May 6, 1868, the undersigned herewith submits the report for 1884 of "The Conrad Poppenhusen Association for the advancement of knowledge, and the improvement of the moral and social condition of the working classes."

F. MARTENS,
Secretary.

RECEIPTS.

Balance on hand January 1, 1884.....	\$5,466 20
Interest on \$28,000 College Point Village bonds at seven per cent.....	1,960 00
Interest on \$1,000 College Point Water bonds at seven per cent.....	70 00
Interest on \$5,000 Oregon and Navigation bonds at six per cent.....	300 00
Interest on \$10,000 Missouri, Kansas and Texas bonds at seven per cent.....	700 00
Interest on \$6,000 Northern Pacific bonds at six per cent.....	360 00
Interest on \$10,000 Long Island City and Flushing bonds at six per cent.....	600 00
Village bonds Nos. 13, 14 and 15 redeemed.....	3,000 00
Rents	1,072 49
Sale of paper.....	1 52
	<hr/>
	\$13,530 21

DISBURSEMENTS.

For Kindergarten:

Salaries of teachers.....	\$960 00	
Supplies.....	45 52	
	<hr/>	\$1,005 52

For Evening Classes:

Salaries of teachers.....	\$880 29	
Supplies	24 06	
	<hr/>	904 35

For Library:

Salary of assistant librarian	\$32 50	
Current supplies	162 12	
Library improvements: book-cases, rail- ing desk, printing and cataloguing...	573 51	
	<hr/>	768 13

For Building:

Repairs.....		555 21
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For General Expenses:

Salary of janitor.....	\$600 00	
Lighting.....	529 80	
Coal and wood.....	317 76	
Water rents.....	63 20	
Sundries.....	67 45	
	<hr/>	1,578 21

For taxes and expenses on real estate.....	66 33
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For Investments:

\$3,000 of six per cent Northern Pacific bonds first mortgage.....	\$3,086 25	
\$3,000 of seven per cent Missouri, Kansas and Texas first mortgage bonds.....	3,138 75	
	<hr/>	6,225 00

Balance on hand December 31, 1884, in Chemical National Bank.....	2,427 46
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\$13,530 21

STATE OF NEW YORK.

No. 36.

IN ASSEMBLY,

JANUARY 23, 1885.

COMMUNICATION

FROM THE COMPTROLLER SUBMITTING REPORT OF THE
FORESTRY COMMISSION.

STATE OF NEW YORK:

COMPTROLLER'S OFFICE,
ALBANY, *January 23, 1885.* }

To the Honorable the Legislature of the State of New York:

At its last session the Legislature, without request or suggestion from me, appropriated \$5,000 to the Comptroller for the employment of experts to report a system of forestry. Pursuant to this authority, I at once appointed Professor Charles S. Sargent, of Harvard University, a trained and eminent specialist; D. Willis James, Esq., of New York city, a public spirited citizen, of large business experience and long interested in this important question; Hon. William A. Poucher, of Oswego, an able lawyer, frequently elevated by his neighbors to elective office, and Edward M. Shepard, Esq., of Brooklyn, a gentleman whose rare native capacity, strengthened by legal study and practice, gives peculiar value to his unselfish and earnest effort to unravel the complexities of this task.

The Commission, therefore, represented the apparently conflicting interests of different neighborhoods and was competent in its administrative and legal equipment, as well as in technical proficiency. Its members have done their work actively and zealously without pay. Of their expenses, more than one-half are for a map of permanent value. Their report — unanimous in all but one particular,

and that a question of administrative method — is now submitted to your honorable body.

It should be noted that although comprehensive and elaborate, it avoids all projects involving large present outlay or future burdens.

Three bills are appended to the report. One of these bills provides for a Forest Commission to be appointed by the Comptroller. In order that the Commission might be freed from partisan entanglement, the proposed act, at my suggestion, was changed from its first form so as not to take effect during the term of the present Comptroller.

The problem in its fulness affects the welfare of many sister Commonwealths and of the Nation at large. It is eminently fitting that in its solution the Empire State should lead the way.

Very respectfully,

ALFRED C. CHAPIN,

Comptroller.

REPORT.

To the Hon. ALFRED C. CHAPIN, Comptroller of the State of New York :

SIR. — The Commissioners appointed by you on the third day of July last, pursuant to the provisions of chapter 551 of the Laws of 1884, to “investigate and report a system of forest preservation,” entered at once upon their duties. They have devoted themselves industriously to the study of the question, and have now the honor to submit the following report :

The Commissioners have examined the forests covering the Adirondack plateau, and the relations which these forests bear to the commercial and industrial interests of the State. They have visited the forest region of Ulster and Delaware counties, and have heard and considered the views of a large number of persons interested, directly and indirectly, in forest property. They have caused a detailed examination of the position and condition of the Adirondack forests to be made by trained forest experts. The results of this examination are displayed in the map joined to this report, which the Commissioners are further able to illustrate, through private liberality, by a series of photographs, which will show, better than any words can describe, the condition to which excessive forest devastation has already reduced large areas within the water-sheds of the principal streams of the State.

STATE LANDS.

It appears from the records of the Comptroller's office that the State has or claims to have title to 781,000 acres of so-called unimproved or forest land.

They are located as follows:

	Acres.
Northern or Adirondack counties.....	750, 000
Delaware county.....	14, 472
Greene county.. ..	2, 646
Sullivan county.....	971
Ulster county.....	3, 543
Scattering	9, 368
	<hr/> 781, 000 <hr/>

It will be seen, by consulting the forest map, that in Essex, Hamilton and Herkimer counties there are large, continuous bodies of State land. Generally, however, State holdings consist of small and often widely-scattered tracts, rarely exceeding a few hundred acres in extent. The locations of the State lands, as indicated upon the map, have been determined from the records in the Comptroller's office. The real position, however, of the State lands is largely a matter of tradition. The surveys which have, at different times, been made of portions of these lands are believed to be generally inaccurate or defective; no general attempt seems to have been made to locate or mark the boundaries of these lands in the woods, while the title of the State to parts of them is disputed by owners of adjoining property. It has, for these reasons, been found impossible to make any special study of the conditions of the State lands in distinction from lands belonging to individuals. It will be necessary, therefore, to consider the forests without regard to ownership. Portions of the State lands located in the most remote and inaccessible districts of the Adirondack region are still covered with the original forest growth; from others all merchantable timber has been removed; while there are considerable areas of these lands entirely stripped of forest covering.

ADIRONDACK REGIONS.

The Adirondack forest region has claimed the principal attention of the Commissioners. The extent of this region, its importance to the people of New York, and the fact that within its borders are found nearly all the wild lands belonging to the State, make the consideration of methods necessary for its preservation of the first importance in any proposed scheme of forest management.

The Adirondack plateau occupies the region which lies between

Lake Champlain on the east and the valley of the Black river on the west ; it reaches south to the valley of the Mohawk river. To the north it extends to the fertile plain of the St. Lawrence. The Adirondack plateau is crossed in the south-east by four distinct ranges of hills ; of these the principal, the Adirondack range, attains a maximum elevation above the sea of over 5,000 feet and contains the highest land in the State.

The western and northern portions of this great plateau contain numerous lakes, interspersed with considerable areas of swamp scattered between the low Laurentian hills. The whole plateau has a high average elevation above the ocean ; the mean average temperature is, therefore, low, while the whole region, with few exceptions, is destitute of deep or rich soil below the surface covering of decaying vegetable deposit. The rain-fall over this whole region is large. The innumerable streams which cut it in all directions, its countless lakes, and extensive swamps show that the Adirondack plateau enjoys a more copious and regularly distributed rain-fall than other portions of the State, less favorably situated in elevations and mean low average temperature to compel the discharge of clouds saturated with moisture.

Extensive and valuable deposits of iron ore underlie portions of the Adirondack plateau ; they are most common in the east and south-east.

ADIRONDACK FARMING.

The Adirondack plateau was once covered with a dense forest. This forest, poor in the number of species which it contains, although vigorous and rich in the development of individuals, illustrates the influence of abundant moisture upon forest growth in regions of low and mean temperature and poor soil. Such regions, if the rain-fall is sufficient, will, within certain limits, produce forests. They cannot, however, be safely or profitably devoted to any other form of husbandry. A wise economy in the use of the natural resources of a country should recognize the fact that certain regions of the earth's surface are adapted by nature to remain covered with forests, and that any attempt to devote such regions to other purposes can only be followed by failure and disaster. The people of New York have not yet learned this lesson. Attempts have been constantly made since the earliest settlement of the northern counties to cultivate the Adirondack plateau. The cheapness of the land has attracted and still attracts settlers to try their fortunes

along the borders of the Adirondack forests. Farms are cleared, two, or at most three, meager crops are snatched from the cold stony land; and then starvation drives the settler, exhausted in the fruitless struggle with the uncompromising and unforgiving fate of nature, to abandon his fields dearly purchased at the price of indescribable suffering and privation, and seek a new home, which in turn must be abandoned at the end of a few years. All attempts at settlement of the Adirondack plateau by an agricultural population, with the exception of some of the most fertile valleys adjacent to the shores of Lake Champlain, and toward the south and south-eastern limits of the region, have resulted in disastrous failure. Abandoned homes and fields are scattered everywhere along the borders of the forest, while the scanty population which still struggles to compel the inhospitable soil to yield it a miserable existence too plainly shows the hopelessness of the task. Probably in no other part of the United States, certainly in no other part of the State of New York, can a more unfortunate agricultural population be found.

VALUE OF ADIRONDACK FORESTS.

The-dearly bought experience of the past fifty years has shown that, except along its eastern and southern borders, the Adirondack plateau is incapable of supporting an agricultural population, and that its real and only value consists in the forests which cover it.

It will be seen that the existence of these forests makes this region more valuable to the people of the State of New York than any other of similar extent within its boundaries. Their extermination will reduce this whole region to an unproductive and dangerous desert. The part which these forests play in the economy of the State is three-fold.

THE FLOW OF RIVERS.

The most important function of the Adirondack forests is found in the influence which they exert upon the streams heading among the hills of the Adirondack plateau, which distribute the heavy rainfall of this region. As reservoirs of moisture, these forests are essential to the continued prosperity of the State; as such they are properly an object of interest to the whole community. Their influence is felt far beyond the limits of the State, and their destruction must be followed by widespread commercial disaster.

The Hudson river, born of many mountain streams, flows in rapid course down the steep southern slopes of the Adirondack mountains. The Mohawk is largely fed by the streams in the south-western portion of the plateau ; the Erie canal receives a large part of its water supply from the upper Black river, diverted from its original northern course for this purpose. Many streams, important to the people of the State, in the aid they bring to great industrial enterprises, although of less general importance and far-reaching influence than the Hudson or the Mohawk, flow out from the Adirondack forests to the St. Lawrence.

It is not necessary to discuss here the question of the influence of forests upon the flow of rivers. Science long ago pronounced upon this subject, which now, moreover, seems to be fully understood in all its bearings by the people of this State. The future of the rivers which flow from the Adirondack plateau may be judged by their past. Great changes have been noticed in these streams since the area of the Adirondack forests has been materially reduced. All the testimony which the Commissioners have been able to collect upon this subject indicates that the summer flow of the Adirondack rivers has decreased within the memory of men now living, from thirty to fifty per cent. Many of the small streams, which a quarter of a century ago were abundantly supplied with water during the entire summer, are now usually dry during many months. It is reported by competent observers that the flow of all the Adirondack streams becomes more uncertain and irregular every year, and that the damage from spring floods and summer droughts is increasing. This is the effect of forest destruction in the past. The evil may be expected to increase under the existing condition of affairs more rapidly in the future than it has increased in the past.*

The reason is obvious. The highest ground from its elevation and temperature compels the largest precipitation of moisture. The most important reservoirs of supply for the Adirondack rivers are upon the high ground about their sources where the rain-fall is heavier and more evenly distributed than at lower elevations. The

* The Superintendent of the New York Central and Hudson River railroad, reports that when the railroad was first built up the Hudson, water was taken from the river at low tide, at Peekskill, for the locomotives. Later, however, the water at this point became so impregnated with salt as to be unfit for use. And now the salt water extends as far up the river as Tivoli, showing, it is argued, that the volume of fresh water now coming down the Hudson is much less than formerly ; and that since 1850 the amount has gradually decreased.

destruction of the forest, however, has, up to the present time, been confined, or largely confined, to the borders of the plateau; the high ridges and slopes of the interior still bear their forest covering. The forests which control the water which falls upon the high Adirondack mountains have hardly been disturbed by the agency of man. And yet it is seen that the destruction of the forests of the far less important lower water-sheds of these streams has reduced their summer flow fully thirty per cent. It is not difficult to foresee, therefore, what must happen to the rivers when the destruction of the forest reaches the high ground which crowns the plateau, or what must be the effect upon the commercial, industrial and mechanical interests of the State, when the controlling portions of the Adirondack forests are exterminated.

THE ADIRONDACK "RESORT."

The first claim of these forests for existence is well founded in the duty which they perform as great natural reservoirs. Only second in importance to this is the part which they play in making the Adirondack plateau attractive. Many thousand persons visit every year the Adirondack lakes and mountains in pursuit of repose, recreation and health. The whole region is one of the most accessible, salutary and enjoyable summer "resorts" in the United States. The number of persons who visit it is growing rapidly, and the number of such visitors may be expected to increase much more rapidly in the future than it has in the past. Greater wealth and population, a growing appreciation of the enjoyment of out-door life, and better means of transportation than now exist, must vastly increase the number of persons anxious to pass a portion of every summer in the woods; and nowhere else in the United States can this object be more freely or easily accomplished. The transporting, feeding, housing and guiding the Adirondack tourists has grown into a large and lucrative business. Millions of dollars are invested in it; and thousands of persons draw from this business their principal support.

The tourist business is now the principal and permanent element of prosperity in the Adirondack region; it is still almost in its infancy. The existence of this business is dependent upon the existence of the forests. They make the Adirondack region attractive; they protect the game which still abounds in some portions of the plateau, and supply the element of wildness, — the charm which draws people to visit this region.

If the forests are destroyed, if the desolation which now everywhere marks the outer border of the forest, is allowed to extend over the entire plateau, this great lucrative business, capable of vast and permanent development, will be lost forever to the State, while the public will be deprived of the opportunity to enjoy the benefits which a visit to the Adirondack woods now offers.

THE LUMBER INDUSTRY.

The manufacture of lumber cut in the Adirondack woods and the gathering of other crops of the forest is a valuable and important industry to the State. This business employs a considerable capital and a large number of men, both in the woods and at the manufacturing centers located on the banks of the principal streams flowing from the Adirondack plateau. It is needless, perhaps, to point out that the life of this business is also dependent upon the life of the forests; and if these are destroyed, this whole business will disappear, and the capital now invested in the mills and tanneries engaged in manufacturing the product of these forests will be lost. In this connection moreover, it must be borne in mind that lumber becomes every year more difficult to obtain throughout the world; that its value in the future must increase in at least the same proportion as it has increased in the past quarter of a century; and that the advantage, from a purely commercial point of view, of retaining in permanent forest, regions adapted to produce forests and nothing else, will be greater as the value of forest products advances under the stimulating influence of increased demand and decreased supply.

The Adirondack region, if the experience of other countries in forest management teaches any thing, could be made to maintain and increase, under a wise and comprehensive policy, the annual output of lumber without serious injury to the forests as reservoirs of moisture or as health resorts for the people; and it is clearly in the interest of the owners of forest property as well as for the people of this State to encourage the adoption of any system of management which will insure such results.

EFFECTS OF FOREST DESTRUCTION.

It must appear to the most casual observer of the present commercial development of the State, that the destruction of the Adirondack forests will prove a serious calamity. If this destruction is al-

lowed, the State will feel the effect in empty rivers and increased droughts. A vast region will be deprived of its only permanent source of wealth, and its inhabitants must gradually sink into a condition of great misery and dependence. Its future lies in the Adirondack forests; if these are destroyed, its prosperity will disappear forever.

CONDITION OF THE ADIRONDACK FORESTS.

Various causes have produced and are still producing the destruction of the Adirondack forests.

RESERVOIRS.

Considerable areas of Adirondack forests in different localities and at different times have been destroyed by the construction of reservoirs built in the hope of increasing the flow of rivers at periods of low water. The custom is a bad one, rarely followed by success commensurate with the cost. The effect of the back water created in this way is disastrous to scenery and natural beauty, while the mass of rotting vegetation it develops is highly injurious to human health. The proper reservoirs for the Adirondack region are the natural woods, and the State might wisely devote its energies to their protection rather than in expending large sums of money in creating reservoirs destructive of property and dangerous to human life as long as they last, and which sooner or later, released by some unusually severe flood, become doubly destructive in their own destruction.

MANUFACTURE OF CHARCOAL.

The manufacture of charcoal on a considerable scale has long been practiced in the Adirondack woods, and especially in the region adjacent to the shores of Lake Champlain. It is the custom, in cutting wood for charcoal, to clear off the forest, taking small as well as large trees. In this way large tracts of land are every year laid bare; still if fire could be prevented from running through the debris left thickly scattered over the ground behind the wood-choppers, no permanent injury to the forest would follow even this wholesale cutting of the charcoal burner, so favorable is the climate to the development of forest growth.

LUMBERING.

Lumbering in the Adirondack forests has long been practiced. Pine and spruce were cut from the valley of the Hudson river and

the shores of Lake Champlain early in the present century. Log cutting has been practiced for many years along the banks of all streams flowing from the Adirondack plateau; and recently such operations, stimulated by the high prices obtained for low-grade lumber, under the existing tariff law, have greatly increased. The heart of the wilderness has been penetrated by the log-cutter. Lumbering operations are now common in regions which a few years ago were considered inaccessible. Trees are cut from the shores of the most remote mountain lakes, and one by one slowly and tediously floated to market down slender and tortuous streams.

No part of the Adirondack forest is now too remote from a stream capable of being driven, or too broken or inaccessible in surface to defy the zeal and energy of the lumberman. The value of lumber in the city of New York, and not the difficulty of obtaining it, controls his operations in the woods. The lumbermen, however, have inflicted little direct damage upon the Adirondack forests.

These forests are principally composed of deciduous hard-wood trees. The sugar maple, the yellow birch, and the beech are the prevailing trees in the southern and eastern portions of this forest, while west and north the beech is the most common species. Among these are dispersed white and red pines, generally forming small and usually isolated groups occupying low, gravelly ridges, and spruce and hemlock widely scattered among the deciduous trees. The hemlock is the most common toward the valley of the Black river. Swamps and low banks of streams are occupied by balsam, tamarack, and toward the north and west by yellow cedar. The high peaks and ridges above 3,000 feet elevation are generally covered with a stunted growth of balsam and spruce of small size and little commercial value. The spruce, the pine, and the hemlock, known as "soft-woods," are the only trees which have, up to the present time, been cut for lumber. The stores of maple, birch and beech contained in these forests have so far escaped the axe of the lumberman. Their trunks are too heavy to float, and cannot, therefore, like lighter woods, be floated down the streams; while the price of hard-wood lumber has not yet justified the adoption of any more expensive method than floating for getting it to market. The proportion of "soft-woods" in these forests is small, probably rarely exceeding five per cent of the whole forest growth; and as these are the only trees cut for lumber, serious injury is not directly inflicted by lumbering.

The "soft-woods" can be cut without taking from the forest its

power to absorb and retain moisture, and without greatly interfering with its general attractiveness. The injury which the lumbermen have inflicted in the Adirondack woods is not in cutting trees; what they have cut would hardly have been missed from the forest. The danger to the Adirondack forests from lumbering, as now practiced (and it is a serious and alarming danger), is this: lumbermen are forced in their operation to leave the branches and other debris scattered over the ground, and thus they increase immensely the danger of forest fires.

FOREST FIRES.

Fires are slowly and surely destroying the Adirondack forests. Unless they can be stopped or greatly reduced in number and violence, nothing can prevent the entire extermination of these forests. They are most common and destructive along the borders of the forest; they do comparatively little injury in the denser growth of the interior. If the Adirondack forests are destroyed, they will perish from the outside.

ORIGIN OF FOREST FIRES.

These fires owe their origin to many causes.

Often they are started in the carelessness of guides, travelers and hunters. Fires originating in this way, however, are less common now than formerly, and as they usually occur in the interior, where dense and heavy undergrowth checks their rapid spread, except during the short period in the spring between the melting of the snow and the unfolding of the leaves—a season of the year when travelers and hunters do not greatly visit the woods—the damage caused by such fires is rarely far reaching.

FIRES IN LOGGING CAMPS.

Fires started among the debris of the logging camps on the charcoal field find abundant material to feed their flames and every year destroy immense tracts of forest. Such fires generally owe their origin to carelessness. Cases are not unknown, however, where fires have been started among the debris left by lumbermen in order to remove, in the destruction of the forest, all traces of operations illegally carried on upon lands belonging to the State.

FIRES SET BY LOCOMOTIVES.

Fires are often set by sparks from locomotive engines ; and great damage has been done along the outskirts of the forest in this way.

FIRES SET BY AGRICULTURAL SETTLERS.

The largest number of forest fires, however, in the Adirondack region, as in other parts of the State, are set by agricultural settlers clearing with fire fields covered with timber. A time of drought, when timber will burn most readily, is naturally selected by the settler to start his fire. He seldom regards the direction of the wind or the condition of the atmosphere. The fire fairly established in the piles of dry brush and fallen timbers, unwatched, and often entirely uncontrollable, almost inevitably spreads from the field to the adjacent forest. Thousands of acres of forest lands are thus burned over every year in attempts to clear a few wretched fields, from which the timber should never have been stripped.

EFFECTS OF ADIRONDACK FOREST FIRES.

These fires have burned a desert belt about the remnants of the Adirondack forests ; every year sees its gradual extension. This is not an exaggerated danger. The forests, upon which the great rivers of the State depend for their water supply ; the forests, which bring into the State thousands of travelers every year and support the population of several counties, are being destroyed in a vain and hopeless struggle on the part of a small and impoverished population to cultivate land unfit for all agricultural crops, and destined by nature to remain perpetually covered with forests.

GENERAL EFFECTS OF FOREST FIRES.

Forest fires do more than consume timber ; they change the nature of the surface soil and deprive it of the ability to produce a second growth of the trees which they destroy. When the maples, beeches and pines of the Adirondack forests are burned, these trees do not appear again. They are followed by a growth of brambles which soon cover the soil ; these in time give way to poplars, wild cherries and other inferior trees of no economic value. Sugar maples rarely spring up from low ground. This new growth, unless destroyed by fire, is in time followed by another, in which appear trees of the species which composed the original forest. Such a rotation of forest crops, however, necessarily occupies long periods of time, and

years must elapse before a forest destroyed by fire can, even under the most favorable conditions, be replaced by a new forest of similar composition. Land, however, upon which the timber has been destroyed by fire rarely escapes subsequent burning. A second fire runs more easily and rapidly than the first over the ground cleared of its protecting covering of undergrowth, and finds abundant fuel in the half-charred trunks which the first fire only partially consumed. Each subsequent fire spreads more rapidly and easily; the surface soil is gradually rendered unfit to produce plants of any sort, or is washed into the streams; rocky slopes are laid bare, and whole regions, once valuable in the forests which they supported, are made worthless forever.

DENUDED ADIRONDACK LANDS.

The effects of continual burning upon the light soils of the Adirondack region may be seen all along the water-shed of the Hudson river and its tributaries, from Luzerne to the southern slopes of the principal Adirondack range of mountains. They may be seen in the sandy wastes stretching between the Black river and the present western limit of the forest, and in the north-east where the manufacture of charcoal has made forest fires common and destructive.

The hills through which the Hudson flows after its rapid descent down the flanks of Mt. Marcy, were once covered with noble forests of maple and birch; pines occupied the sandy intervals; the spruce and hemlock, scattered through the forests of these hills, supplied the manufacturer of lumber with logs, and the tanner with bark. These hills are now mere piles of bare rock, stripped of vegetation, or only supporting a growth of weeds and bushes, feebly pushing from holes and crevices; destitute of soil, terrible in the very hopelessness of their ruin and destruction. Fire has reduced these hills to their present condition. What fire has done in the past it will do in the future, and so long as these fires are allowed to rage, nothing can prevent the extermination, at no very distant day, of the whole Adirondack forest. The preservation of this forest is reduced to a question of the possibility of preventing forest fires. If they can be stopped, this forest can be preserved; if they are allowed to go on, nothing can prevent its early and total ruin.

THE FORESTS OF THE CATSKILL REGION.

The forests of the Catskill region are not unlike in actual condition those covering the hills which mark the southern limits of the

Adirondack plateau. The merchantable timber and the hemlock bark were long ago cut, and fires have more than once swept over the entire region, destroying the reproductive powers of the forest as originally composed and ruining the fertility of the thin soil, covering the hills. The valleys have now, however, all been cleared for farms, and forest fires consequently occur less frequently than formerly. A stunted and scrubby growth of trees is gradually repossessing the hills, which, if strictly protected, may sooner or later develop into a comparatively valuable forest. The protection of these forests is, however, of less general importance than the preservation of the Adirondack forests. The possibility of their yielding merchantable timber again in any considerable quantities is at best remote; and they guard no streams of more than local influence. Their real value consists in increasing the beauties of summer resorts, which are of great importance to the people of the State.

DANGER FROM NEW METHODS OF LUMBERING.

It is true, that lumbering, as at present carried on in the Adirondack forests does not, perhaps, always greatly affect their permanency. There is every indication, however, that the existing methods must soon change, as the demands for hard-woods increase. The Northern Adirondack railroad has already been built several miles into the forest by a firm of lumbermen, with the avowed purpose of furnishing transportation for hard-woods which abound along its line. The most enterprising lumbermen are already endeavoring to secure a profitable market for their hard-woods; and it is inevitable that in a very short time the demand for beech, maple and birch will justify the construction of narrow-gauge logging railroads or tramways to all parts of the forest; and that the general introduction of such roads must be followed by their general extermination.

SUGGESTIONS FOR PRESERVING THE ADIRONDACK FOREST.

The value of the Adirondack forests has been explained, their present conditions and the dangers which threaten them described; it now remains to discuss the methods which it seems wise, under the circumstances, to adopt, if any attempt is to be made to check the ruin of these forests clearly doomed to destruction unless something is done to arrest the causes operating against their existence.

STATE OWNERSHIP.

The Commissioners are not prepared to recommend the pur-

chase or condemnation of wild lands by the State. The practical objections to any such scheme seem to them insuperable. It will not be denied that the future permanence of these forests cannot be absolutely insured except through State ownership and control. Experience has shown that private ownership means — sooner or later — forest destruction. Individuals will cut down their forests, or allow them to burn up, when it is for their interest to do so, without regard to public welfare. The spirit of American laws and the sentiment of the American people are opposed to any State interference with the enjoyment by individuals of the right to do as they please with their own. Public sentiment is not ready to acknowledge that the State can rightly interfere in the management of forest property, or that the owners of such property in its treatment owe any thing to neighbors or descendants. It is probably impracticable to regulate by law the cutting or planting of trees on the land of individuals, or impose upon them by act of Legislature methods of forest management. It must be conceded that if the people of this State are convinced that the preservation of the Adirondack forests is essential to their future prosperity, there is but one way by which they can be certain of accomplishing that end. Absolute control can be insured only by absolute purchase. There are forest estates in the Adirondack region which are, and for many years have been, wisely and economically managed. Such management, however, lacks the guaranty of permanency. The death of an individual or a change in the condition of the timber trade may at once throw any of these estates into the hands of mere speculators, who, like too many owners of Adirondack property, are content to remove all merchantable timber from the land as fast as possible, and then permit it to return to the State for unpaid taxes. Powerful as are these considerations, the practical embarrassments, however, in the way of any general State purchase seem to the Commissioners decisive. The enormous expenditure that would be required, and the danger of artificially enhancing the value of such lands for the sake of a sale to the State, have convinced the Commissioners that the State cannot wisely enter upon any scheme of general purchase.

STATE PURCHASE OF FORESTS.

The Commissioners believe that, under different circumstances the State might acquire the whole Adirondack forest by purchase: and that the price of such a purchase, if the forest could be effi-

ently managed by the State, would be returned, directly and indirectly, to the people a hundred fold. The securing at the present time effective State management of forests is too doubtful, however, in connection with the other considerations already advanced, to justify them in recommending the State to purchase these lands at the exorbitant prices which owners, in the hope of selling to the State, now place upon them. State control of forests, in any proper meaning of the term, has never been attempted in the United States. It will be wise to make the first experiment upon a small scale, and without large expenditures in advance of assured success. The State already owns in the aggregate no inconsiderable part of the Adirondack forest; and it is not improbable that its holding will be very largely increased during the next few years by the voluntary relinquishment, in lieu of payment of taxes, of land from which the soft-woods have been cut. The State should first demonstrate its ability to protect the forests which it already owns, and develop a wise system of forest management applicable to these lands, before the question of the purchase of other lands of the same character can be seriously considered.

PRESENT MANAGEMENT OF STATE LANDS.

There is nothing in the past management of its wild land by the State to justify their increase by purchase at this time. Little attention has ever been paid to the care of these lands. As their bounds have not been marked attempts to guard them from depredation have naturally been unsuccessful. The State lands everywhere offer opportunity and inducement for theft. The existing system encourages idleness; it educates people living near them to feel that it is right to use as much of the public property as they can safely appropriate to their own uses; and it pauperizes a considerable population. There are settlements along the border of the forest where it is an open boast that the population live almost entirely upon the products of the State lands. Trees are cut on these lands for shingles and lumber. The wood is habitually taken for domestic use, and often for market. The forests suffer under the present management, and the people of the region are degraded.

IMPORTANCE OF PROTECTING STATE FORESTS.

The rigid protection of the forests still covering lands belonging to the State, or which, it is probable, must soon be relinquished to

the State, and the gradual growth of trees upon lands now denuded, which will naturally follow the decrease of fires, will accomplish, if not all, at least something in the direction of preserving for the people of the State the advantages which they derive from the existence of the Adirondack forests. The State forests, thus extended and protected, may be expected to check any further considerable degradation of the principal rivers of the State, and will afford abundant opportunity for the enjoyment by the people of the pleasures and benefits of sylvan retreat. The lumber product, however, would, during a long period of years and for the whole region undoubtedly be much larger under uniform State administration than if cut by individuals without regard to the maintenance of the supply. It is hardly the function of the State, however, to become a lumber producer, except so far as lumber production is incidental to the protection of forests essential to public safety. Private owners of forest property must be left to regulate the supply of timber by the demand, and devise and put into execution the methods necessary for the development of their property. The protection of rivers is the aim and excuse for forest ownership by the State; and the production of lumber should be made secondary to this controlling purpose.

OBJECTIONS TO PRESENT SYSTEM.

The management of the public forest must be shielded from the effects of political change so far as it is practicable to do so, if the State desires to obtain the best results from its ownership. The care and improvement of forest property, in order to be effective, should be based upon some well-considered system, requiring in its development a long series of years, and demanding an administration of thoroughly trained, skillful and enthusiastic officials.

The duties which belong to the complete guardianship of the forest preserve obviously have a close relation to the duties of the Comptroller. This was recognized by the Legislature at its last session in committing to him the initiative of the present investigation. The executive of the proposed forest law, will, upon the plan now to be submitted, have the custody of a great part of the public domain. He will probably have the collection of some revenue from sales of timber which is cut for the better preservation of the remaining trees. He will have to discharge very important functions with relation to the non-payment of taxes upon forest lands, and with relation to the proper assessment for taxation of

State lands within the forest preserve. The work of the forest executive, however, will, especially at the outset, be of a character requiring undivided official attention, a careful study of business and scientific problems which are new in this country, the opportunity to conduct, without interruption, experiments stretching over several years, and a good knowledge of the varied relations of the forest problem as well as of the general interests of the State. The Comptroller rarely holding office for more than one or at most two terms, and occupied in various and perplexing duties, cannot, therefore, be expected to insure the execution of the permanent policy essential for the wise management of forests. The incumbent of an elective office of such importance has neither the time to organize nor the power to maintain the far-reaching system of forest control which the importance and necessities of the case demand.

IMPORTANCE OF A FOREST COMMISSION.

The Commissioners believe that the wild lands now belonging to the State, or which the State may acquire from time to time, can only be safely administered by a Commission. Such a Commission should be non-political in character. Its members should serve for considerable periods of time, in order that a fixed policy may be insured. Absolute power of appointment and dismissal of subordinates should be vested in the Commission; without such power they would be helpless to secure effective forest administration. The reward of the office of Commissioner must be found in the consciousness of the performance of great public services, and not in the hope of pecuniary recompense. Men fitted to fill the responsible position of Forest Commissioner will find abundant honor in preserving the public forests and in inaugurating a broad system of forest control for the State of New York without seeking other reward. Salaries, however small, would bring an element of instability into the composition of such a commission, and sooner or later defeat the purpose for which it was created. The present relations of the Comptroller to the wild lands of the State, and to the proposed work of the Commission, make it desirable that the appointment of the Forest Commissioners should be made by that officer; and that he should have over them some power of removal.

The Commissioners are aware that experience has led the public to doubt the executive efficiency of commissions or boards of several members. But the Forest Commission will not, like the Superin-

tendent of Public Works, the Superintendent of the Capitol, or a Commissioner of Emigration, be a mere executive of a long-established and well-defined duty. The Forest Commission will have a sort of legislative function. It is to devise regulations for the administration of a great public domain ; it is to lay down a general policy for such administration. It has an advisory and consulting function almost as important as its executive functions. A body capable of inaugurating this great work must be composed of members representing different bodies of citizens, different trainings and different experiences.

The singleness necessary to executive efficiency the Commissioners propose shall be found in the forest warden, who is intended to be the active executive officer in the forest administration. He will represent the policy of the Commission, but should be left untrammelled in the execution of the details of his work.

It is of the utmost importance that the forest warden should not be exposed to political vicissitudes or be deemed in any respect a political officer. He should, therefore, have no definite term of office beyond the pleasure of the Commission. The person selected for this position must have peculiar qualifications. He must have a good scientific training and excellent business ability. But beyond these, he must bring to his office tact, vigor, firmness and the breadth and aptitude of mind which are needed at the inauguration of any new policy.

A very serious objection to the appointment of a forest warden or paid forest commissioner as an executive head for a fixed term is the grave doubt whether, with the utmost care on the part of the appointing authority, a man having the qualifications just mentioned will be at first selected. Some of these qualifications nothing but experience will develop ; and the Forest Commission, it is to be presumed, will not hesitate to make changes until the peculiar ability requisite in the forest warden is found. A fixed term, whatever might be the provisions for removal, would be a serious danger to the efficiency and success of the forest administration. And the decision as to the ability of the forest warden should be with a body whose sole official concern is with the forests.

When such an officer is found properly equipped for the duties of the place, it would be wise to retain him as long as his services are efficiently performed. He would certainly need many years, probably not less than ten, to establish and perfect any general system of forest treatment.

During several of those years the value of his services to the State would become greater and greater. The latter element it has also seemed wise to the Commissioners to recognize by increasing his salary year by year for six years.

The same considerations have been applied to the less important officers in the forest administration. The proposal of the Commissioners is to establish these places upon a purely business basis and to remove them completely from the accidents of political and personal changes. And unless this general idea prevail in the novel and critical work contemplated by the laws proposed, it is not reasonable to suppose that it will succeed. Nor can it be expected in that case that the enormous material interests of the State involved in the proper solution of the forestry problem will be adequately protected.

TAXES ON STATE LANDS.

It appears from the report of the special committee on State lands in the Adirondack region, made to the Senate in January, 1884, that in 1873 the State owned 38,854 acres of wild land; that from 1873 to 1883 the area of State lands increased about 711,762 acres, making the total area of such lands in 1883 750,616 acres. This acquisition of land by the State took place almost entirely through the purchase of lands by the State tax at sales. There is little doubt that in the immediate future, if there be no change in the conditions of the Adirondack wilderness, there will be added several hundred thousand acres to this domain of three-quarters of a million acres which the State now holds. It has been suggested that this tendency of lands to accrue to the State from the non-payment of taxes may possibly solve the forest problem by making the State ultimately the owner of all the lands within the Adirondack forest. It is to be noticed, however, that this very acquisition of lands by the State which has occurred almost entirely within the last twelve years is the clearest and most striking demonstration of the destruction of natural wealth which has taken place in that region. These lands have fallen into the ownership of the State simply because they have been stripped of their merchantable timber and rendered waste, and for many years to come practically valueless. The lands which will come to the State hereafter through tax sales will likewise come because they will have suffered a similar ruin. It is of vital moment to the State to put an end, if possible, to the temptation to strip the land of its forest wealth,

which the practical absence of an efficient collection of the taxes has created. Under the present law prevailing in the forest counties the tax becomes collectible between November and February in each winter, and it is not until about four years from the succeeding summer that the State can completely divest the title of the owner who refuses to pay his taxes. This period of nearly four years and a half is the minimum period required if the proceedings of the local authorities and of the Comptroller be conducted with the utmost rapidity which the law permits. In practice, however, sales for unpaid taxes have been held at intervals of several years, rarely less than four and often as many as seven. It will be perceived, therefore, that the owner of forest lands in the Adirondack region who proposes to strip the lands of all their forest value and then to surrender them to the State will have a period of between five and ten years during which he has practically complete immunity from the payment of taxes, and an enormous advantage over his competing neighbor who may feel compelled to pay his taxes. This is practically what has been done. The lands acquired by the State have been acquired after their long abandonment. They have been acquired after the towns, the counties and the State have lost the taxes of many years, and the lands have finally fallen to the State stripped of merchantable timber, and requiring fully half a century for their restoration to a condition in which, under existing condition of the lumber business, they can have any commercial value.

The Commissioners consider it to be obviously just between the State and its citizens, as well as a matter of the greatest moment to the welfare of the State, that the owners of lands in this wilderness who have decided to bear no longer their fair share of the expenses of the government, shall not be permitted to waste and ravage the real estate which is in itself the only security the State holds for the payment of the taxes levied upon it. The third bill which the Commissioners have prepared proposes, therefore, to prevent the cutting or removing of timber from lands in the Adirondack region upon which the taxes are overdue. It proposes also to enable the Forest Commission, as part of their duty in the preservation of the forests, to directly enforce this law. There is nothing oppressive in such a provision. Forest land differs from building lots, farms and nearly all other lands in the State, in that its sole present and available value consists in a growth which may be completely removed to

the utter destruction of the value, although the land nominally remains.

It also seems to the Commissioners obviously wise that the proceedings for the collection of taxes upon forest lands in the Adirondack region should be much more efficient. Communication with the remotest part of this forest region is now more rapid than in former years, and there is no longer a valid reason why the delay should be so great in giving title to the State upon lands whose owners propose to abandon them. Forest lands are neither homesteads nor farms, and tax laws which may be properly indulgent to a farmer or the owner of a house ought to be made much more strict with respect to forest property controlled generally by large owners. It is no exaggeration to say that when an owner of forest lands has let the taxes for one year go into arrears, he has usually taken the first deliberate step toward a surrender of the lands, and the only doubt is to what extent he can, to his own profit, render the lands valueless before his surrender of them is complete. The Commissioners propose, therefore, in the third bill to reduce very greatly the delay in the proceedings upon the non-payment of taxes, and to make those proceedings much more certain and efficient, and to bar objections to the title of the State after a reasonably short time. There is no good reason why an owner of forest lands should be indulged more than one year after the taxes have become overdue, before his title is vested finally and absolutely in the State.

This change will also afford a reasonable protection to the owners of property in the Adirondack towns, who now pay their taxes and are unjustly compelled to bear a steadily-increasing burden imposed upon them by owners, generally without permanent local interests, and desiring to seek new fields of operation as soon as they have completely stripped the old fields of their value. If the State speedily acquire such land, and then, as the Commissioners next proposed, if the State pay or bear the taxes upon the land, the inhabitants who honestly and promptly pay their taxes will be at once relieved of the unjust burdens of unpaid taxes which sooner or later fall upon them.

It is only after the most careful and prolonged consideration that the Commissioners have concluded to recommend that the State hereafter bear taxes upon its lands in the Adirondack region. The Commissioners are aware that this is an unusual course for a government to follow, with respect to its own lands. But the peculiar cir-

cumstances of this case make the course obviously just, if the general plan the Commissioners recommend should be adopted.

Upon this general plan, the State lands in the Adirondacks are to be hereafter held and acquired, not for the especial benefit of the counties in which they lie, but in a much greater degree for the benefit of the whole State. It is not, therefore, the case of a county court-house, jail, asylum or other local institution. Nor is it the case of a single building or of a few buildings, which, like the Capitol or a State insane asylum, though benefitting the whole State more than the county in which it stands, still forms so inconsiderable a part of the real property of that county that if a tax were laid upon it, the tax would be no more than the share of benefit which the county derives. In the Adirondacks the present lands of the State are a considerable fraction of the lands in very many towns. By the bills now submitted a policy is proposed which will probably result in a considerably greater acquisition of lands by the State upon sales for taxes. Ultimately, therefore, there will probably be the position of the State holding a large part of the property in the Adirondack towns which would normally pay taxes, and this holding would be chiefly for the benefit of the rest of the State.

It is to be observed, also, that when the State becomes the owner of lands upon the plan now considered, the State assumes many of the advantages of a private owner which ought, in common fairness, to carry with them the corresponding burdens. The roads in the Adirondack region will afford access and protection to the State lands. The courts, offices and officials of the Adirondack counties will be constantly used by the State in the protection of its domain and in the assertion and establishment of rights with respect thereto, precisely as they are used by private citizens. It is not unreasonable, therefore, that the State should, up to the extent of taxes upon the lands which it holds in these counties, bear a proportion of the expenses of local administration whose benefits it receives.

The Commissioners, as has been intimated, believe, as did the Senate committee of 1883, and as is believed by nearly all who have studied the problem, that default in the payment of taxes will bring to the State, from time to time, considerable acquisitions of land. If the State do not pay or bear taxes upon these lands, then the remaining owners in the various Adirondack towns will see their burdens steadily increase without any increase to them of the benefits which taxation purchases.

It is obvious, however, if the general scheme of administration

of State lands now proposed be not adopted, that the reason for an assumption of taxes by the State disappears.

There is annexed to this report, in Appendix A, tables showing the total area of wild lands in the Adirondack region and the taxes levied thereon in the year 1883. These tables have been prepared by Mr. William H. Sanger, of the Comptroller's office, to whose large and varied information upon this subject and upon many matters relating to the State lands in the Adirondacks, and to whose zealous and intelligent labors the Commissioners feel themselves greatly indebted. The tables are, of course, not entirely accurate, but are sufficiently so to furnish a reasonably close estimate of the annual amount the State may be called upon to pay for taxes.

The total acreage of wild lands in the Adirondacks is about 3,600,000. The taxes for 1883 upon these lands was about \$113,000. If the average of value of 750,000 acres of lands now owned by the State were as high as the general average, the State would have to pay or bear annually for taxes about one-fifth of \$113,000, or about \$23,000. But doubtless many, if not most, of the State lands are recently abandoned and wasted lands, and, therefore, worth considerably less than the average of the wild or forest lands. So that at the present scale of valuations, it is doubtful whether the State would have upon the lands it now owns to bear more than an annual payment of about \$15,000.

And this or a somewhat greater payment the Commissioners believe would be a very slight price for the State to pay for the advantages which a sense of fair dealing by the State in the Adirondack region would bring to the plan which it is now proposed to establish. This plan must be largely dependent for its usefulness and success upon the support of public opinion in the region of the forest preserved. The Commissioners are thoroughly convinced, indeed, that apart from questions of taxation, the proposed forest preserve will add materially to the permanent prosperity of the Adirondack counties. But this is not the main reason which induces the State to consider the present plan for forest preservation; and it is an insufficient reason for the State, through an arbitrary exercise of its sovereign power, to refuse to contribute to the support of counties and towns, the benefit of whose institutions it proposes as a great land owner to share.

The necessity of making the establishment of State titles more certain is too well known and obvious to need argument. The third

proposed law provides, therefore, that after reasonable opportunity to attack the State title and pay accrued taxes, the Comptroller's deed shall become conclusive evidence of title.

NECESSITY OF GENERAL FOREST LAWS.

It is desirable that private owners of forest and wild lands as well as officers of the State should be invested with more authority to protect their property, under the law, than they now possess.

PROTECTION AGAINST SETTLERS.

The owners of such property need protection against persons clearing land by fire without regard to the safety of their neighbors' forests. The protection of forests is impossible unless the unrestrained practice of setting such fires can be prevented.

PROTECTION AGAINST TRESPASS.

Owners of forest property require more power than the law now affords them to secure the punishment of trespassers upon their lands, to prevent the setting of fires in their forests, and to stop the cutting and killing of trees.

COMPULSORY BURNING OF DEBRIS IN THE FOREST.

It has often been suggested that lumbermen in this State should be compelled by law to gather and carefully burn branches, chips and other debris left by them in their logging camps. The presence of such debris in the forests is an element of great danger and increases enormously the probability of destructive forest fires. The impossibility, however, of collecting and burning such refuse in the Adirondack forest at least, as long as only the soft-woods are cut, will be apparent to any one familiar with these forests. It is rare that more than ten trees are ever cut to the acre by lumbermen, and the enforced burning of the debris of these trees in the midst of a dense forest would be a greater source of danger to the growing timber than if left to rot upon the ground. In the former case, forest fires would be practically inevitable; in the latter case, there would always be a chance that the debris might become covered with unflammable undergrowth, or its combustibility lessened by decay before the spark of some careless settler or hunter might ignite it. In cases where a considerable portion of the forest is cut

at once, as in cutting for charcoal, the danger of burning the debris would disappear, and such a plan might wisely be adopted.

DANGER FROM RAILROADS.

It has already been pointed out that many forest fires originate from the sparks of locomotive engines. The damage to the State from this cause is widespread, and has already attracted the attention of railroad managers. The railroads of the State of New York pay a large sum of money every year in fire damages. These are largely paid for injury inflicted upon growing timber, and represent the loss of material destroyed and not the injury sustained by the land from being burned over,—often a more serious calamity to the community than the mere loss of timber. Numerous attempts have been made to overcome this evil, through the adoption of some efficient spark consumer which could be used on locomotives without interfering with their power of generating steam. None of the contrivances yet tried have been satisfactory in all particulars; and it does not appear wise at this time to enact any compulsory legislation, looking to the general adoption by the railroads of spark consumers—desirable as such legislation might be in the case of their refusing to adopt a thoroughly efficient invention. This, however, the most intelligent railroad managers are already anxious to do for their own protection; and the treatment of this question can for the present at least be safely left to them. When a really efficient and economical contrivance is found, it will be wise to make its general adoption compulsory by legislative action.

SUMMARY.

The Commissioners are convinced that a portion of the Adirondack forest is essential to the welfare of the State, and that its present holding of wild lands should be strictly preserved and protected. They do not believe, under existing circumstances, that the State should acquire wild lands by purchase, except at tax sales.

They believe that the State forests cannot be longer protected under the present system, and that the appointment of a Forest Commission with abundant power is essential to secure their permanency.

They believe that the laws regulating the sale of wild land on account of unpaid taxes should be modified, so as to prevent the destruction of the property, while the taxes remain unpaid; to

hasten the proceedings for sales of lands for such unpaid taxes, and to perfect the title of the State to the lands it now owns or hereafter acquires upon such sales.

They believe that the State should bear in common with individuals the proportion of taxes assessable on its lands.

They believe that greater security than now exists under the law for the protection of forests should be given to the owners of wild and forest lands, and that trespassers upon such property should be promptly punished.

They have prepared a series of bills (see appendices B, C, and D), which contain the important features of the scheme of forest management which they recommend. Your attention is invited to the consideration of these bills. The Commissioners believe that they will be found to contain no provisions conflicting with any vested interests, and that no honest citizen will be injured by their passage. Laws, however, are not all that is necessary, and forests cannot be preserved by legislative action alone. A forest law, to effect its purpose, must rest on a broad and solid basis of public interest. The only real safety for the forest will be found in the appreciation of its value by the community.

Dated ALBANY, *January 23*, 1885.

CHARLES S. SARGENT.
D. WILLIS JAMES.
EDWARD M. SHEPARD.

To Hon. ALFRED C. CHAPIN, Comptroller :

The undersigned dissents from that portion of the report of the majority of the Commission appointed under the provisions of chapter 551 of the Laws of 1884, to investigate and report a system of forest preservation, which recommends the passage of an act authorizing the appointment of a commission of three to serve without compensation, who shall be vested with power to appoint and remove at pleasure the superintendent, forest wardens and other officers and employees necessary to carry out the provisions of the proposed act; and also dissents from the reasoning and arguments advanced by the majority in their report in support of the appointment of such commission. The undersigned believes that a single responsible head should be appointed by the Governor to carry into effect the proposed legislation and thus obviate the evil effects which flow from "divided counsels and divided responsibility."

A three-headed non-paying commission meeting only occasionally would be an entirely useless and unnecessary body and an embarrassment rather than a help to a competent executive officer having the actual charge of the forests. It is well known that the work of non-paying State boards of commissions is chiefly done and the business planned and conducted by the secretary or other paid officer; and whether it be well or poorly done depends not so much upon the character and ability of the board as upon the efficiency, integrity and competency of its paid executive officer. I, therefore, respectfully recommend a modification of the proposed act in accordance with the views above expressed.

In other respects I concur with the majority report and approve the recommendations contained therein.

W. A. POUCHER.

APPENDIX A, § 1.
STATEMENT of the acreage of forest or wild and cleared or improved lands in the Adirondacks, with the assessed value in 1883 of each class, compiled from reports of the assessors of the various towns.

CLINTON COUNTY.

TOWNS.	Acreage of wild lands.	Assessed value in 1883.	Acreage of cleared lands.	Assessed value in 1883.	Total acreage.
Altona.....	10,799.95	\$16,995 00	51,131.50	\$241,338 00	61,931.45
Ausable*.....	13,120	75,000 00	11,130	23,410 00	24,250
Black Brook.....	29,407	42,680 00	51,512	252,401 00	80,919
Clinton	14,876	17,985 00	25,601	162,711 00	40,477
Dannemora.....	30,164.50	64,216 00	4,122	88,465 00	34,286.50
Ellenburgh.....	44,132	198,594 00	19,152	153,216 00	63,284
Peru	15,813	40,375 00	29,347	664,820 00	45,160
Saranac	22,875	27,070 00	40,319	346,430 00	63,194
Total.....	181,187.45	\$462,915 00	232,314.50	\$1,932,791 00	413,501.95

ESSEX COUNTY.

Chesterfield	21,500	\$64,500 00	21,500	\$761,070 00	43,000
Crown Point.....	14,619	10,390 00	30,290	1,185,483 00	44,909
Elizabethtown.....	34,934	55,030 00	12,661	287,405 00	47,595
Jay.....	2,677	9,593 00	39,009	419,585 00	41,686
Keene.....	56,752	45,500 00	33,267	111,451 00	90,019
Lewis.	22,538.90	66,580 00	26,435	199,891 00	48,973.90
Minerva.....	65,564.10	68,739 00	26,431.50	58,276 00	91,995.60
Moriah ..	13,398	19,125 00	20,704	3,626,187 00	34,102

APPENDIX A, § 1.— Continued.

ESSEX COUNTY — Continued.

TOWNS.	Acreage of wild lands.	Assessed value in 1883.	Acreage of cleared lands.	Assessed value in 1883.	Total acreage.
Newcomb	118,484.30	\$129,111 00	10,498	\$25,215 00	128,982.30
North Elba	35,598.67	19,871 00	12,946.33	+38,839 00	48,545
North Hudson	84,302	+84,302 00	2,500	+7,500 00	86,802
Schroon	56,395	45,340 00	17,641	201,600 00	74,036
St. Armand	10,836	16,615 00	6,304	34,806 00	17,140
Ticonderoga * t	20,500	20,500 00	28,080	140,400 00	48,580
Wilmington	20,778	13,908 00	13,955.25	48,265 00	34,733.25
Total	578,876.97	\$669,104 00	302,222.08	\$7,145,973 00	881,099.05

FRANKLIN COUNTY.

Belmont t	77,720	\$77,720 00	25,000	\$100,000 00	102,720
Brandon	90,169	180,338 00	19,902.60	153,451 50	110,071.60
Brighton	27,125	14,903 00	1,728	12,011 00	28,853
Duane	23,740.75	40,760 00	2,712	6,550 00	26,452.75
Franklin	53,843	55,283 00	15,961	63,844 00	69,804
Harriettstown	86,065	80,068 00	11,949	43,254 00	98,014
Malone (S. 1-2)	6,096	6,150 00	24,904	124,520 00	31,000
Waverly	107,254.32	130,344 00	42,312.37	89,285 00	149,566.69
Total	472,013.07	\$1,285,566 00	144,468.97	\$592,915 50	616,482.04

FULTON COUNTY.

Bleecker.....	30,787	\$15,393 00	1,500.33	\$31,887 00	32,287.33
Caroga.....	23,000	18,000 00	6,000	30,000 00	29,000
Mayfield.....	9,552	9,552 00	27,817.25	640,787 00	37,369.25
Stratford	24,007	26,483 00	17,501	49,605 00	41,508
Total.....	87,346	\$69,428 00	52,818.58	\$752,279 00	140,164.58

[Assem. Doc. No. 36.]

HAMILTON COUNTY.

Arietta t.....	139,200	\$152,000 00	1,700	\$18,000 00	140,900
Benson ..	16,120	16,120 00	9,668	9,185 00	25,808
Hope t	10,718	10,718 00	20,000	45,000 00	30,718
Indian Lake.....	108,771	41,246 00	13,262	44,671 00	122,033
Lake Pleasant.....	82,773	205,330 00	10,407	39,104 00	93,180
Long Lake	165,086	275,090 00	7,035	50,800 00	172,121
Morehouse ..	134,597	149,350 00	1,674	17,401 00	136,271
Wells	92,059	150,830 00	3,515	133,877 00	95,574
Total.....	749,324	\$1,000,684 00	67,281	\$458,038 00	816,605

HERKIMER COUNTY.

Ohio t.....	14,120	\$15,000 00	14,880	\$74,400 00	29,000
Salisbury.....	41,336	44,030 00	26,497	393,242 00	67,833
Wilmurt	447,856	144,485 00	7,515	17,610 00	455,371
Total	503,312	\$203,515 00	48,892	\$485,252 00	552,204

LEWIS COUNTY.

TOWNS.	Acreage of wild lands.	Assessed value in 1883.	Acreage of cleared lands.	Assessed value in 1883.	Total acreage.
Croghan	50, 229	\$51, 330 00	55, 595	\$352, 220 00	105, 824
Diana	64, 272	42, 000 00	16, 800	35, 096 00	81, 072
Greig	28, 677	39, 148 00	21, 776	72, 230 00	50, 453
Lyonsdale	24, 853	22, 709 00	16, 673	66, 251 00	41, 526
Watson	22, 277	17, 980 00	38, 940	133, 872 00	61, 217
Total.....	190, 308	\$173, 167 00	149, 784	\$659, 669 00	340, 092

SARATOGA COUNTY.

Corinth.....	5, 527	\$9, 518 00	27, 305	\$234, 136 00	32, 832
Day.....	14, 422	5, 750 00	25, 400	70, 065 00	39, 822
Edinburgh.....	20, 000	35, 977 00	16, 000	96, 000 00	36, 000
Hadley.....	11, 500	9, 200 00	11, 500	103, 500 00	23, 000
Moreau.....	12, 000	12, 000 00	13, 735	216, 263 00	25, 735
Total.....	63, 449	\$72, 445 00	93, 940	\$719, 964 00	157, 389

ST. LAWRENCE COUNTY.

Clare	27, 052	\$31, 290 00	3, 168	\$11, 020 00	30, 220
Clifton	48, 664	36, 498 00	6, 336	31, 680 00	55, 000
Colton	154, 759	185, 590 00	37, 109	310, 980 00	191, 868
Fine.....	96, 510	57, 760 00	5, 707	37, 775 00	102, 217
Hopkinton	131, 794	190, 240 00	39, 856	323, 980 00	171, 650
Parishville.....	30, 043	60, 500 00	29, 495	452, 450 00	59, 538

Pierrepont.....	2, 400	10, 410 00	34, 294	413, 810 00	36, 694
Pitcairn ..	21, 588	30, 410 00	14, 252	48, 440 00	35, 840
Total.....	512, 810	\$602, 698 00	170, 217	\$1, 630, 135 00	683, 027

WARREN COUNTY.

Bolton	8, 020	\$21, 310 00	22, 228. 50	\$350, 185 00	30, 248. 50
Caldwell.....	13, 180	79, 080 00	5, 726	82, 359 00	18, 906
Chester.....	2, 189	5, 525 00	46, 554	372, 586 00	48, 743
Hague.....	25, 792	12, 896 00	12, 896	14, 186 00	38, 688
Horicon.....	7, 105	9, 885 00	30, 656	176, 712 00	37 761
Johnsburgh †	69, 995	69, 995 00	69, 005	138, 010 00	139, 000
Luzerne.....	6, 556	4, 500 00	28, 188	78, 451 00	34, 744
Queensbury	4, 462	25, 940 00	32, 322	780, 340 00	36, 784
Stony Creek.....	30, 000	15, 000 00	20, 000	35, 802 00	50, 000
Thurman	21, 574	20, 325 00	29, 289	47, 608 00	50, 863
Warrensburgh.....	20, 855	17, 550 00	14, 874	135, 184 00	35, 729
Total.....	209, 728	\$282, 006 00	311, 738. 50	\$2, 211, 423 00	521, 466. 50

WASHINGTON COUNTY.

Dresden.....	16, 670. 75	\$12, 650 00	13, 989. 50	\$130, 003 00	30, 660. 25
Fort Ann †.....	33, 000	76, 000 00	33, 000	198, 000 00	66, 000
Putnam	15, 584	136, 084 00	3, 896	116, 880 00	19, 480
Total....	65, 254. 75	\$224, 734 00	50, 885. 50	\$444, 883 00	116, 140. 25

SUMMARY.....	3,613,609.24	\$5,066,262 00	1,624,562.13	\$17,033.322 50	5, 238, 171. 37
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* Villages not included.

† Estimated.

APPENDIX A, § 2.

STATEMENT of taxes for the year 1883, on forest or wild lands in the Adirondacks, tabulated from reports of county treasurers, and returns to the Comptroller's office.

CLINTON COUNTY.

TOWNS.	Paid in county.	Returned to Comptroller.	Total.	Total based on assessed value and rate per cent of tax.
Altona	\$294 64	\$563 10	\$857 74	
Ausable	15 18	15 93	31 11	
Black Brook	167 93	165 81	333 74	
Clinton	146 08	171 81	317 89	
Dannemora	455 93	308 04	763 97	
Ellenburgh	2, 139 64	1, 720 05	3, 859 69	
Peru	51 48	38 54	90 02	
Saranac	92 91	160 08	252 99	
Total	\$3, 363 79	\$3, 143 36	\$6, 507 10	\$9, 702 25

ESSEX COUNTY.

Chesterfield	\$26 52	\$45 21	\$71 73	
Crown Point	55 81	9 21	65 02	
Elizabethtown	400 37	108 78	509 15	
Jay	185 06	38 41	223 47	
Keene	1, 265 84	968 30	2, 234 14	
Lewis	619 91	123 75	743 66	
Minerva	3, 375 72	3, 685 26	7, 060 98	
Moriah ..	71 02	57 42	128 44	
Newcomb	2, 400 39	2, 419 04	4, 819 43	
North Elba	872 52	950 64	1, 823 16	
North Hudson	1, 354 00	1, 226 81	2, 580 81	
Schroon	588 47	397 13	985 60	
St. Armand.	627 66	797 87	1, 425 53	
Ticonderoga	87 48	353 69	441 17	
Wilmington	320 03	81 12	401 15	
Total	\$12, 250 80	\$11, 262 64	\$23, 513 44	\$24, 242 09

FRANKLIN COUNTY.

Belmont	\$2, 487 86	\$575 32	\$3, 063 18	
Brandon	591 50	2, 404 01	2, 995 51	
Brighton	61 07	744 72	805 79	
Duane ..	324 72	505 11	829 83	
Franklin	121 81	1, 189 74	1, 311 55	
Harriettstown	146 08	540 99	687 07	
Malone (S. 1-2).	81 17	13 59	94 76	
Waverly ..	2, 559 28	2, 159 85	4, 719 13	
Total	\$6, 373 49	\$8, 133 33	\$14, 506 82	\$14, 860 66

APPENDIX A, § 2 — *Continued.*

FULTON COUNTY.

TOWNS.	Paid in county.	Returned to Comptroller.	Total.	Total based on assessed value and rate per cent of tax.
Bleecker	\$153 44	\$514 96	\$668 40	
Caroga	380 11	194 95	575 06	
Mayfield	38 92	80 13	119 05	
Stratford	163 62	610 38	774 00	
Total	\$736 09	\$1,400 42	\$2,136 51	\$2,136 51

HAMILTON COUNTY.

Arietta	\$1,175 85	\$4,215 64	\$5,391 49	
Benson	100 66	1,772 90	1,873 56	
Hope	327 47	53 97	381 44	
Indian Lake	2,258 46	1,872 73	4,131 19	
Lake Pleasant	184 53	3,355 95	3,540 48	
Long Lake	138 21	9,256 64	9,394 85	
Morehouse	201 16	3,436 97	3,638 13	
Wells	822 97	2,293 27	3,116 24	
Total	\$5,209 31	\$26,258 07	\$31,467 38	\$31,467 38

HERKIMER COUNTY.

Ohio	\$254 55	\$113 97	\$368 52	
Salisbury	726 78	376 75	1,103 53	
Wilmurt	2,365 94	1,816 46	4,182 40	
Total	\$3,347 27	\$2,307 18	\$5,654 45	\$5,654 45

LEWIS COUNTY.

Croghan	\$337 45	.....	\$337 45	
Diana	2,962 84	.....	2,962 84	
Greig	1,430 49	.....	1,430 49	
Lyonsdale	361 59	.....	361 59	
Watson	231 11	.....	231 11	
Total	\$5,323 48	.....	\$5,323 48	\$7,037 46

SARATOGA COUNTY.

Corinth	\$32 50	\$69 92	\$102 42	
Day	1 37	132 06	133 43	
Edinburgh	17 43	64 47	81 90	
Hadley	24 00	46 14	70 14	
Moreau	272 26	.....	272 26	
Total	\$347 56	\$312 59	\$660 15	\$1,123 73

APPENDIX A, § 2 — *Continued.*

ST. LAWRENCE COUNTY.

TOWNS.	Paid in county.	Returned to Comptroller.	Total.	Total based on assessed value and rate per cent of tax.
Clare....	\$445 79	\$3 49	\$449 28	
Clifton	496 22	225 21	721 43	
Colton	1, 146 19	1, 074 32	2, 220 51	
Fine.....	596 61	884 90	1, 481 51	
Hopkinton	1, 116 03	846 16	1, 962 19	
Parishville	191 62	5 35	196 97	
Pierrepont	76 35	4 40	80 75	
Pitcairn	448 73	564 83	1, 013 56	
Total.....	\$4, 517 54	\$3, 608 66	\$8, 126 20	\$8, 367 86

WARREN COUNTY.

Bolton	\$48 71	\$43 01	\$91 72	
Caldwell	104 88	4 76	109 64	
Chester	50 87	.....	50 87	
Hague	112 24	292 93	405 17	
Horicon.....	63 90	11 13	75 03	
Johnsburgh	219 25	1, 984 10	2, 203 35	
Luzerne	72 12	109 81	181 93	
Queensbury....	70 00	.....	70 00	
Stony Creek.....	39 40	887 97	927 37	
Thurman ...	80 49	1, 222 13	1, 302 62	
Warrensburgh.....	97 28	77 18	174 47	
Total.....	\$959 14	\$4, 633 02	\$5, 592 16	\$7, 368 92

WASHINGTON COUNTY.*

Dresden.....	\$123 43	\$52 66	\$176 09	
Fort Ann.....	721 85	95 91	817 76	
Putnam	1, 105 95	.....	1, 105 95	
Total.....	\$1, 951 23	\$148 57	\$2, 099 80	\$2, 099 80

SUMMARY.

Summary.....	\$44, 379 70	\$61, 207 84	\$105, 587 54	\$113, 361 11
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* Estimated.

APPENDIX B.

AN ACT for the preservation and care of the Adirondack Forest.

WHEREAS, It is requisite for the maintenance of important water-courses within this State, for furnishing, restoring and securing to the Hudson river a continuous and regular supply of water, for furnishing and securing a sufficient supply of water to the Erie, Champlain and Black River canals, for the protection and preservation of the valleys of the Hudson, the Mohawk, the Black River, the Raquette, the Au Sable, and other rivers and streams from inundation, and otherwise for the general welfare and public purposes of the State, that the Adirondack forests should be preserved, and that the lands in their vicinity which are not fit for tillage should become and remain covered with forest trees, therefore

The People of the State of New York, represented in Senate and Assembly, do enact as follows :

SECTION 1. All the lands now owned or which may hereafter be acquired by the State of New York within the counties of Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, Warren and Washington shall constitute and be known as the forest preserve.

§ 2. The lands now or hereafter constituting the forest preserve shall be forever kept as wild forest lands. They shall not be sold or leased except as hereinafter provided, or taken or used by any public officer, or by any person or corporation, public or private, except as herein especially provided, under the permission of the Forest Commission ; nor shall they be condemned by any court or commission ; nor shall any lake or water-course thereon be altered, diverted or interfered with, nor shall it be lawful to overflow any of the said lands by means of any dam or obstruction on other lands.

§ 3. There shall be a Forest Commission, which shall consist of three commissioners, the first appointment of whom shall not, however, be made before the first day of January, eighteen hundred and sixty-six. The Commissioners shall be appointed by the Comptroller, and shall serve without compensation, except that there shall be paid them their reasonable expenses incurred in the performance of their official duties. Each Commissioner shall serve for a term of seven years and after his term until his successor shall be appointed, excepting that of the three Commissioners first appointed, one, to be designated by the Comptroller, shall serve for a term of three years and after his term until his successor shall be appointed ; the second, to be designated by the Comptroller, shall serve for a term of five years, and after his term until his successor shall be appointed, and excepting that in case of the death, resignation or removal of a Commissioner before the expiration of his term of office, or in the case where a successor is appointed in place of a Commissioner holding over his term, the successor shall be appointed only for the unexpired portion of the term in which his predecessor was serving. The appointment of every Commissioner shall be made by the Comptroller in writing, which shall be filed in the

office of the Secretary of State ; and every Commissioner shall, before entering upon the duties of his office, take and deposit in the office of the Secretary of State an oath duly certified by the officer before whom the same was taken, such oath to be in the form prescribed for State officers by section twenty, article third, chapter five, part one, of the Revised Statutes. Upon charges preferred against any Commissioner or against the efficiency of his discharge of his duties, which charges the Commissioner shall have had an opportunity to meet, he may be removed from office by the Comptroller upon the approval of the Governor, the removal to be in writing and to be filed in the office of the Secretary of State.

§ 4. The Forest Commission shall, after the first appointment of Commissioners, have the care, custody, control and superintendence of the forest preserve. It shall be the duty of the Commission to maintain and protect the forests now on the forest preserve, and to promote, as far as practicable, the further growth of forests thereon ; and the Commission shall perform such other duties as may be devolved upon it by law.

§ 5. It shall be the duty of the Comptroller to cause suitable and convenient rooms and accommodations to be assigned or provided, and to be furnished, heated and lighted at the city of Albany, for carrying on the work of the Forest Commission, and to cause the necessary stationery and other office articles to be supplied and the necessary printing to be done for the Commission ; and the cost and expense thereof, and the several salaries, compensations and necessary expenses in this act expressly provided for, upon the same being stated in detail and verified by affidavit as the Comptroller may direct, shall be paid from any moneys in the treasury not otherwise appropriated.

§ 6. The Forest Commission shall from time to time appoint a forest warden who shall hold office during the pleasure of the Commission, and who shall be paid an annual salary of three thousand dollars, and of two hundred and fifty dollars additional for every completed year of his own service in the office, until the annual salary of four thousand five hundred dollars is reached, and also his necessary expenses incurred in the discharge of his duties. The forest warden shall in the care, custody and superintendence of the forest preserve and in the performance of the other duties of the Commission, render such services as the Commission may direct. The Forest Commission may also employ during its pleasure at any time two forest inspectors, to perform such duties as the Commission or the forest warden, with its permission, shall direct. The forest inspectors shall each be paid an annual salary of one thousand five hundred dollars and of one hundred and sixty-six and two-thirds dollars additional for every completed year of his own service in the office until the annual salary of two thousand five hundred dollars is reached, and also his necessary expenses incurred in the discharge of his duties. The Forest Commission may also employ during its pleasure at any time a clerk, who shall perform such duties as it may direct, and who shall be paid an annual salary of one thousand two hundred and fifty dollars, and of one hundred and twenty-five dollars additional for every completed year of his own service in the office, until an annual salary of two thousand dollars is reached.

§ 7. The Forest Commission may from time to time prescribe rules or regulations, and may from time to time alter or amend the same, affecting the whole or any part of the forest preserve, and for its use, care and administration. A copy of these rules or regulations shall be filed by the Forest Commission in the office of the clerk of each of the counties of Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, Warren and Washington; and in each of the said counties the said rules or regulations shall take effect upon the filing of such copy in the office of the clerk of the said county. And such rules or regulations may, among other things, provide:

1. For the admission of persons upon the forest preserve under such conditions as in the judgment of the Forest Commission may be necessary or proper for the security of the preserve and for the exclusion of all persons therefrom excepting in the cases prescribed for their admission;

2. For the licensing of guides by the Forest Commission or by such officers as it may designate, and for each such license the Forest Commission may, in its discretion, require the payment of an annual license fee not exceeding five dollars; and for the suspension and withdrawal of such licenses;

3. For the disposition of such timber, standing or cut, as shall have grown to an age which renders it advantageous for the general preservation of the forests that the said timber should be removed, and for the establishment of conditions upon which the disposition of such timber shall be made;

4. For the prevention and extinguishment of fires;

5. For the making of roads and ways intended to facilitate the protection of the preserve; and

6. Otherwise for the proper custody, care, administration and use of the forest preserve.

None of the rules or regulations so to be prescribed shall contravene the provisions of any act not expressly or impliedly repealed by the provisions of this act; nor shall any such rule or regulation interfere with the service or execution of any process, civil or criminal, upon the forest preserve; nor shall any such rule or regulation be deemed to modify any provision of any law for the protection of game or the preservation of fish.

§ 8. The Forest Commission may, upon such conditions and for such rent as it may deem wise, let sites upon the forest preserve for lodging-houses or hotels, no site to include more than ten acres of land, and no site to include any part of any stream, pond, or body of water. The conditions of every such lease and the rent thereby reserved shall be made public by the Commission; and no such lease shall be for a greater period than five years, excepting that where the lessee stipulates in his lease with the Commission, which is authorized to accept such stipulation, to erect upon the site a building or buildings to be approved by the Commission, and to maintain the same under such approval, the lease may be made for a period not exceeding ten years, with a provision that if the Commission do not, at the expiration of the lease, offer to purchase the said buildings at a valua-

tion to be made as provided in the lease, then the lease to be renewed for the same length of time as the original lease, the second or renewal lease to be upon the same conditions as the original lease, excepting that the amount of the rental under the second lease shall be determined as provided in the original lease, and excepting that the second lease shall provide that at the end of the term thereof, if the Commission do not offer to purchase the said buildings at a valuation to be made as provided in such second lease, then the said second lease to be renewed for the same length of time as the original lease, such second renewal or third lease to be upon the same conditions as the original lease, excepting that the amount of the rental under such third lease shall be determined as provided in the said second lease, and excepting that the said third lease shall contain no provision for a renewal but, instead thereof, a provision that at the end of the term thereof, the buildings upon the said site shall belong to and form part of the forest preserve.

§ 9. The four game protectors hitherto appointed by the Governor, pursuant to the provisions of chapter five hundred and ninety-one of the laws of eighteen hundred and eighty, as amended by chapter three hundred and seventeen of the laws of eighteen hundred and eighty-three,* to whom have been or may be assigned districts including any part of the forest preserve, shall, so far as is consistent with the performance of the duties now devolved upon them by law, act under the direction of the Forest Commission in the protection of all forests in the counties mentioned in section first of this act from fire, and in the extinguishment of fires thereon. Upon the expiration of the present terms of office of the present game protectors, the entire number of game protectors appointed by the Governor in their places shall not exceed twelve; and none of such game protectors shall act within the said counties mentioned in section first of this act. The Forest Commission shall thereupon from time to time appoint, to serve during its pleasure, four protectors, who shall be residents of the counties mentioned in section first of this act, and who shall be familiar with the forest preserve, and shall have practical knowledge as woodsmen, who shall be paid the compensation now provided by law to be paid to game protectors, and who shall perform all the duties and have all the powers now belonging to game protectors, and who, in addition, shall perform such duties as the Forest Commission may prescribe in the protection from fire of all forests within the said towns (whether or not the said forests be part of the forest preserve), and in the extinguishment of fires thereon.

§ 10. The Forest Commission, the forest warden, the forest inspectors, the foresters, and any other persons employed by or under the authority of the Forest Commission, and who may be authorized by the Commission to assume such duty, shall within the towns mentioned in section first of this act, whenever the woods in any such town shall be on fire, perform the duty imposed upon, and in such case shall have the powers granted to, the justices of the peace, the

* By this statute it is provided (§ 1) as follows: "The Governor is hereby authorized, upon the passage of this act, to appoint eight, and he may in his discretion increase the number of said appointments to sixteen persons, to be known as game and fish protectors," etc.

supervisors, and the commissioner of highways of such town by title fourteen of chapter twenty of part one of the Revised Statutes,* with reference to the ordering of persons to assist in extinguishing fires or stopping their progress; and any person so ordered by the Forest Commission, the forest warden, the forest inspectors, the foresters, or any of them, or any other person acting or authorized as aforesaid, who shall refuse or neglect to comply with any such order, shall be liable to the punishment prescribed by the said title.

§ 11. The Forest Commission shall have, as to all lands now or hereafter included in the forest preserve, but subject to the provisions of this act, all the powers now vested in the Commissioners of the Land Office and in the Comptroller as to such of the said lands as are now owned by the State.†

§ 12. Every willful violation of any rule or regulation prescribed by the Forest Commission, as provided in section seven of this act, shall be deemed a misdemeanor; and any person guilty of such violation shall, upon conviction thereof, suffer a fine not exceeding two hundred and fifty dollars, or imprisonment not exceeding three months, or both, in the discretion of the court.

§ 13. The forest warden, forest inspectors, foresters, and other persons acting upon the forest preserve under the written employment of the forest warden or of the Forest Commission, may, without warrant,

* This title is in 1 R. S., pp. 696, 697, as follows :

§ 1. Every person negligently setting fire to his own woods, or negligently suffering a fire kindled upon his own wood or fallow land to extend beyond his own land, shall forfeit treble damages to the party injured thereby. Every person so offending shall also be deemed guilty of a misdemeanor, and, on conviction, shall be punished by fine or imprisonment, or both, at the discretion of the court; such fine not to exceed one thousand dollars, and such imprisonment not to exceed one year.

§ 2. Whenever the woods in any town shall be on fire, it shall be the duty of the justices of the peace, the supervisors and the commissioners of highways of such town, and of each of them, to order such and so many of the inhabitants of such town liable to work on the highways, and residing in the vicinity of the place where such fire shall be, as they shall severally deem necessary, to repair to the place where such fire shall prevail, and there to assist in extinguishing the same or in stopping its progress.

§ 3. If any person so ordered to repair to and assist, in manner aforesaid, shall refuse or neglect to comply with any such order, he shall forfeit and pay the sum of fifty dollars, and shall also be deemed guilty of a misdemeanor, and, on conviction, shall be punished by fine or imprisonment, or both, at the discretion of the court; such fine not to exceed one hundred dollars, and such imprisonment not to exceed fifty days.

§ 4. Every forfeiture recovered under the last section shall be applied as a reward to such person or persons as the officers above mentioned, or a majority of them, shall deem best entitled thereto for superior exertions in extinguishing or stopping the progress of such fire.

Vide also section 414 of the Penal Code, which is as follows :

§ 414. Refusing to assist in extinguishing fire in the woods :

A person who, having been lawfully ordered to repair to the place of a fire in the woods and assist in extinguishing it, omits, without lawful excuse, to comply with the order, is guilty of a misdemeanor.

†The powers and duties of the Comptroller and the Commissioners of the Land Office as to lands belonging to the State are to be found in 1 R. S., pp. 197-209 (articles first, second, third and fifth of chapter nine, part one); in chapter 268 of the Laws of 1830, chapter 61 of the Laws of 1831, and in chapters 18 and 470 of the Laws of 1883.

arrest any person found upon the forest preserve violating any of the provisions of this act or any of the rules or regulations prescribed by the Forest Commission, as provided in section seven of this act ; but, in case of such arrest, the person making the arrest shall forthwith take the person arrested before a magistrate having jurisdiction to issue warrants in such case, and there make or procure to be made a complaint in writing, upon which complaint the magistrate shall act as the case may require.

§ 14. The Forest Commission may bring in the name or on behalf of the people of the State of New York any action to prevent injury to the forest preserve or trespass thereon, to recover damages for such injury or trespass, to recover lands properly forming part of the forest preserve, but occupied or held by persons not entitled thereto, and in all other respects for the protection and maintenance of the forest preserve, which any owner of lands would be entitled to bring. The Forest Commission may also maintain in the name or on behalf of the people of the State an action for the trespass specified in section seventy-four, article fifth, title five, chapter nine, part one of the Revised Statutes,* when such trespass is committed upon any lands within the forest preserve. In such action there shall be recoverable the same penalty and a like execution shall issue, and the defendant be imprisoned thereunder without being entitled to the liberties of the jail, all as provided in sections seventy-four and seventy-six of the said article ; and in such action the plaintiff shall be entitled to an order of arrest before judgment as in the cases mentioned in section five hundred and forty-nine of the Code of Civil Procedure. The trespass herein mentioned shall be deemed to include, in addition to the acts specified in the said section seventy-four, any act of cutting or causing to be cut, or assisting to cut, any tree or

*Sections 72, 73, 74, 75 and 76 of this article are in 1 R. S., p. 209, as follows :

§ 72. The Commissioners of the Land Office may require the sheriff of any county in which lands belonging to the people of this State, for which patents shall not have been issued, or any Indian lands, may be situated, to examine and report to them, and to the district attorney of his county, any trespasses that may be committed on such lands, by cutting or carrying away the timber thereon.

§ 73. Every district attorney, on receiving any such report, and also whenever directed by the Commissioners of the Land Office, shall commence suits against such trespassers, for the penalty imposed in the next section ; or shall present indictments against such trespassers to the grand jury of his county, as he shall judge most discreet. In either case, he shall cause the witnesses to support such prosecutions to be duly subpoenaed, and shall conduct such prosecutions to a final determination.

§ 74. Every person who shall trespass on any land belonging to the people of this State, or any Indian lands, by cutting or carrying away timber growing thereon, shall forfeit and pay the sum of twenty-five dollars for every tree that shall be cut or carried away by him or under his direction.

§ 75. The district attorney shall apply such penalties, when collected, first to the payment of the costs and expenses incurred, including a reasonable compensation to the witnesses who shall attend in behalf of the people, to be certified by the court before which such recovery shall be had, and shall pay the residue thereof into the treasury of the court.

§ 76. Whenever execution shall be issued upon judgment recovered in actions for such penalties, and the body of any defendant shall be arrested thereon, he shall be imprisoned according to law, without being entitled to the liberties of the jail.

timber standing within the forest preserve, or any bark thereon, with intent to remove such tree or timber, or any portion thereof, or bark therefrom, from the said forest preserve.

With the consent of the Attorney-General and the Comptroller, the Forest Commission may employ attorneys and counsel to prosecute any such action, or to defend any action brought against the Commission, or any of its members or subordinates, arising out of their or his official conduct with relation to the forest preserve. Any attorney or counsel so employed shall act under the direction of and in the name of the Attorney-General. Where such attorney or counsel is not so employed, the Attorney-General shall prosecute and defend such actions.

§ 15. In an action brought by or at the instance of the Forest Commission an injunction, either preliminary or final, shall upon application be granted restraining any act of trespass, waste or destruction upon the forest preserve; and in cases where any lands within the forest preserve are being overflowed or injured, or are threatened with overflow or injury by the maintenance of any dam or obstruction which may hereafter be erected in any stream, lake or body of water, the court shall, by injunction, restrain the further erection of the dam or obstruction, and the court may order the removal or partial removal of the dam or obstruction during the pendency of the action.

§ 16. Whenever the State owns or shall own an undivided interest with any person in any lands within the counties mentioned in section first of this act, or holds, or shall hold, or is or shall be in possession of any such lands as joint tenant or tenants in common with any person who has an estate of freehold therein, the Attorney General shall, upon the request of the Forest Commission, bring an action in the name of the people of the State of New York for the actual partition of the said lands according to the respective rights of the parties interested therein; and upon the consent in writing of the Forest Commission any such person may maintain an action for the actual partition of such lands according to the respective rights of the parties interested therein, in the same manner as if the State were not entitled to exemption from legal proceedings; service of process in such action upon the Attorney-General to be deemed service upon the State. Such actions, the proceedings and the judgment therein, and the proceedings under the judgment therein shall be according to the practice at the time prevailing in actions of partition, and shall have the same force and effect as in other actions, except that no costs shall be allowed to the plaintiff in such action, and except that no sale of such lands shall be adjudged therein. The Forest Commission may, without suit, but upon the consent of the Comptroller, agree with any person or persons owning lands within the said towns jointly or as tenants in common with the State for the partition of such lands, and upon such consent may make, on behalf of the people of the State, any conveyance necessary or proper in such partition, such conveyance to be forthwith recorded as now provided by law as to conveyances made by the Commissioners of the Land Office.

§ 17. The Forest Commission shall, in every year immediately before the thirty-first of December, make a written report to the Comp-

troller of their proceedings, together with such recommendations of further legislative or official action as they may deem proper.

§ 18. The sum of fifteen thousand dollars, or so much thereof as may be necessary, is hereby appropriated for the purposes mentioned in this act during the year eighteen hundred and sixty-six, out of any moneys in the State treasury not otherwise appropriated.

§ 19. All acts and parts of acts inconsistent with this act are hereby repealed so far as the same are so inconsistent with this act.

§ 20. This act shall take effect immediately.

APPENDIX C.

AN ACT for the protection of forests, and to amend the Penal Code.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Section four hundred and thirteen of the Penal Code* is hereby amended so as to read as follows:

§ 413. A person who negligently or willfully —

1. Sets fire or assists another to set fire to his own woods, or any other woods, by means whereof the property of another, or of the State, is endangered; or who

* This section now reads as follows:

§ 413. Negligence in respect to fires.— A person who negligently sets fire to his own woods, by means whereof the property of another is endangered, or who negligently suffers any fire upon his own land to extend beyond the limits thereof, is guilty of a misdemeanor.

Section 640 of the Penal Code is as follows:

§ 640. Malicious injury and destruction of property.

A person who willfully —

1. Cuts down, destroys or injures any wood or timber, standing or growing, or which has been cut down and is lying on lands of another, or of the people of the State; or

2. Cuts down, girdles, or otherwise injures a fruit, shade, or ornamental tree standing on the lands of another, or of the people of the State; or

3. Severs from the freehold of another, or of the people of the State, any produce thereof, or any thing attached thereto; * * * * *

is punishable by imprisonment not exceeding six months, or a fine not exceeding two hundred and fifty dollars, or both.

Section 654 of the Penal Code is as follows:

§ 654. Injury to real or personal property, how punished:

A person who unlawfully and willfully destroys or injures any real or personal property of another, in a case where the punishment thereof is not specially prescribed by statute, is punishable as follows:

1. If the value of the property destroyed, or the diminution in the value of the property by the injury is more than twenty-five dollars, by imprisonment for not more than four years.

2. In any other case, by imprisonment for not more than six months, or by a fine of not more than two hundred and fifty dollars, or by both such fine and imprisonment.

3. And in addition to the punishment prescribed therefor, he is liable in treble damages for the injury done, to be recovered in a civil action by the owner of such property, or the public officer having charge thereof.

2. Upon any land whether or not his own kindles or maintains any fire for any purpose, so that the same may extend to, burn or injure any trees, saplings, or forest growth, upon land not his own ; or who

3. Suffers any fire upon his own land to extend beyond the limits thereof ; or who

4. Within the limits of any town, two-thirds of whose total area consists of land covered with forests or of land which, although not so covered with forests, is wild, or not customarily tilled or used for pasture or building sites, or within two miles of the boundary of any such town, burns or sets fire to, or assists another to burn or set fire to trees, stumps, bushes, brush, underbrush, grass, or any undergrowth, cut or standing, or any of them, or clears, or assists another to clear lands by means of fire, unless upon permission in writing to be given as in such cases provided by law (provided, however, that this subdivision shall not extend to fires set within the limits of any garden or yard attached to any dwelling-house or barn, or to fires kindled simply for the cooking of food or for warmth, if the person or persons kindling such fire for cooking or warmth remain by the fire until the same is extinguished), or who

5. Cuts down, girdles, rings, or otherwise injures a tree upon lands not his own, without the permission of the owner thereof —

Is guilty of a misdemeanor, and is punishable by imprisonment not exceeding six months, or by a fine not less than fifty dollars, but not exceeding two hundred and fifty dollars, or both.

§ 2. Upon the application in writing of ten citizens of any county, or of the Forest Commission, and upon the consent of the Comptroller, it shall be the duty of the State Engineer and Surveyor forthwith upon such information as he possesses or may obtain to estimate what proportion of the total area of any town within the county consists of land covered with forests, or of land which, although not so covered with forests, is wild or not customarily tilled or used for pasture or building sites. Upon completing his estimate, the State Engineer and Surveyor shall reduce the same to writing in duplicate and certify and sign each duplicate, and file one duplicate in the office of the clerk of the county within which such town is situated, and the other duplicate in the office of the clerk of the town. The State Engineer and Surveyor shall also file a copy of such estimate in the office of the clerk of every town bordering upon the town for which such estimate was made. The supervisors of any county for which such estimate shall be made shall adjust, audit and provide means for the payment of, and the treasurer of such county shall thereupon pay the reasonable expenses so incurred by the State Engineer and Surveyor. After the expiration of five years from the making of any such estimate, upon like application and consent and in like manner, the State Engineer and Surveyor shall make a further estimate, to be reduced to writing, certified, signed, filed, and copies thereof filed in all respects as hereinbefore provided, which further estimate when so filed in the office of the clerk of the county shall supersede every former estimate.

§ 3. In the case of the commission of any of the acts mentioned in the fourth subdivision of section four hundred and thirteen of the Penal Code as amended by section first of this act within any county, or within two miles of the boundary thereof, after an estimate has been

made, as provided for in the next preceding section, and has been filed in the office of the clerk of such county, upon any prosecution, suit or proceeding whatsoever, civil or criminal, brought for the punishment of such violation, or relating thereto, such estimate shall be conclusive evidence of the fact that two-thirds of the total area of the town mentioned in the estimate consist of land covered with forests, or of land which, although not so covered with forests, is wild, or not customarily tilled or used for pasture or building sites.

§ 4. Application in writing for permission to burn or set fire to trees, stumps, bushes, brush, underbrush, grass, or any undergrowth, cut or standing, or some of them, made by any person owning or occupying land within any town mentioned in the fourth subdivision of the first section of this act, may be made to the supervisor of the town, excepting, however, that in the towns of Altona, Au Sable, Black Brook, Clinton, Dannemora, Ellenburgh, Peru, and Saranac in Clinton county; the towns of Chesterfield, Crown Point, Elizabethtown, Jay, Keene, Lewis, Minerva, Moriah, Newcomb, North Elba, North Hudson, Schroon, St. Armand, Ticonderoga and Wilmington in Essex county; the towns of Belmont, Brandon, Brighton, Duane, Franklin, Harriestown, Malone (the southerly half thereof) and Waverly in Franklin county; the towns of Bleecker, Caroga, Mayfield and Stratford in Fulton county; the towns of Arietta, Benson, Hope, Indian Lake, Lake Pleasant, Long Lake, Morehouse and Wells in Hamilton county; the towns of Ohio, Salisbury and Wilmurt in Herkimer county; the towns of Croghan, Diana, Greig, Lyonsdale and Watson in Lewis county; the towns of Corinth, Day, Edinburgh, Hadley and Moreau in Saratoga county; the towns of Clare, Clifton, Colton, Fine, Hopkinton, Parishville, Pierrepont and Pitcairn in St. Lawrence county; the towns of Bolton, Caldwell, Chester, Hague, Horicon, Johnsburgh, Luzerne, Queensbury, Stony Creek, Thurman and Warrensburgh in Warren county; and the towns of Dresden, Fort Ann and Putnam in Washington county — such application shall be made to the officer or person designated for that purpose by the Forest Commission by its rules or regulations, if such designation shall have been made. Upon such application such supervisor, officer or person shall summarily decide, in view of the season, the temperature, dryness or moisture prevailing, the position of the land, the proximity thereto of forests, the direction of the wind, and the other circumstances of the case, whether it will endanger any forest growth, to burn or set fire to trees, stumps, bushes, brush, underbrush, grass or any undergrowth, cut or standing, according to the application; and if such supervisor, officer or person shall decide that it will not endanger any forest growth to so burn or set fire, he shall give to the applicant a permission in writing to so burn or set fire.

§ 5. Any person committing any of the acts specified in section four hundred and thirteen of the Penal Code as amended by section first of this act shall be liable to any owner of lands upon or to which a fire kindled in violation of such provisions shall be or extend, or upon whose land shall have been any tree so cut down, girdled, ringed or injured for three times the damages thereby caused such owner and the sum of one hundred dollars in addition thereto. In an action brought by the owner to recover such damages after, by verdict or

otherwise as the case may be, the amount of such damages has been ascertained, judgment shall be rendered in favor of the owner for three times the amount so ascertained and for one hundred dollars in addition thereto. Upon any trial to recover such damages for a violation of subdivision fifth of section first of this act, the value of a tree which is a sapling shall in any case be presumed, and without evidence shall be deemed proven, to be at least two dollars and a half, and the value of a tree larger or older than a sapling shall in any case be presumed, and without evidence shall be deemed proven, to be at least five dollars. In every such action upon proof, by affidavit, of the facts, the plaintiff shall be entitled to an order of arrest against the defendant, as in the cases mentioned in section five hundred and forty-nine of the Code of Civil Procedure; in such action the plaintiff's right to arrest the defendant shall be deemed to depend upon the nature of the action; and upon any judgment in such action an execution may issue against the person of the judgment debtor as provided in the sections of the Code of Civil Procedure relating to execution against the person. The owner shall likewise be entitled to bring an action to prevent injury to his lands by any of the acts in this section hereinbefore mentioned; and in such action shall be entitled to an injunction preliminary and final according to the practice prevailing at the time in other actions in which preliminary and final injunctions may be granted.

§ 6. The term "owner," used in the section next preceding, shall include any person or persons, corporation or corporations, or the people of the State, having an estate in fee, or for a life or lives, or for ten remaining years or upwards, in lands, providing, however, that but one civil recovery shall be enforced for any one act herein mentioned. As to lands within the forest preserve, the Forest Commission shall be entitled in behalf of the people of the State to bring actions as owners. Any one of several owners shall be entitled to maintain an action for such damages without joining the other owners, providing that where several actions are brought by different owners to recover the same damages, the court may consolidate the actions and require the plaintiffs to sue together and to be entitled to but one bill of costs. In such action the defendant shall be liable to pay such damages but once.

§ 7. All acts and parts of acts inconsistent with this act are repealed so far as the same are inconsistent with this act.

§ 8. This act shall take effect immediately.

APPENDIX D.

AN ACT for the speedy collection of taxes upon the forest lands in certain towns in the counties of Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, Warren and Washington.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Lands covered with trees, saplings, sprouts or seedling trees and lands which, although not so covered, are wild and not customarily tilled or used for building sites are hereby defined and are hereinafter described, and they shall be known as forest lands.

§ 2. All lands belonging to the State, or which may hereafter be acquired by the State, within the counties of Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, Warren and Washington, and which form or shall form part of the forest preserve, shall be assessed and taxed at a like valuation and at a like rate to those at which the lands of individuals within such counties are assessed and taxed, subject, however, to the provisions of this act. On or before August first in every year, the assessors of the town within which the lands so belonging to the State are situated, shall file in the office of the Comptroller and in the office of the Forest Commission a copy of the assessment-roll of the town, which, in addition to the other matters now required by law to be stated therein, shall state and specify which and how much, if any, of the lands assessed are forest lands, and also and separately which and how much, if any, of the lands assessed are lands forming part of the forest preserve, such statement and specification to be verified by the oaths of a majority of the said assessors. The Comptroller shall thereupon, and before the first day of September following, and after hearing the Forest Commission and the assessors, if they, or any of them, so desire, correct or reduce any assessment of lands forming part of the forest preserve which may in his judgment be in unfair proportion to the remaining assessments of lands within the town, and shall in other respects approve the assessment and communicate such approval. And no such assessment of lands within the forest preserve shall be valid for any purpose, until the amount of the assessment is so approved by the Comptroller, and such approval attached and deposited with the assessment-roll of the town and therewith delivered by the assessors of the town to the supervisor of the town or other officer authorized to receive the same from the assessors. No tax for the erection of a school-house or for opening a road shall be imposed upon lands within the forest preserve unless such erection or opening shall have been first approved in writing by the Forest Commission. If the board of supervisors of any of the said counties in which shall be part of the forest preserve shall, at their annual meeting, or at any other time, alter the valuations of real estate in any town, then no tax levied upon any part of the forest preserve within the said county shall be valid until the Comptroller shall have received from the board

of supervisors a duly authenticated copy of the aggregate valuation of the real estate in the several towns therein and the valuation of the real estate in every town separately as corrected by them, together with a duly authenticated copy of the aggregate and separate valuations of the real estate in the towns and in every town as the same had been made by the assessors and theretofore approved by the Comptroller, and until after so receiving the same the Comptroller shall approve of corrections made by the board of supervisors, and certify and return such approval in writing to the said board prior to the delivery of the corrected assessment-rolls to the town collector. Payment of the taxes which may be imposed according to law and the provisions of this act upon lands so belonging to the State shall in every year be made by the Treasurer of the State upon the certificate of the Comptroller as to the lawful and just amount of such taxes by allowing to the treasurer of the county in which any such lands may be situate a credit of the amount of such taxes due upon such lands upon the amount payable by such county treasurer in such year to the State for State taxes, providing, however, that no fees shall be allowed by the Comptroller to the county treasurer in adjusting their accounts for such portion of the State tax as is so paid.

§ 3. Whenever a tax imposed upon forest lands (other than lands forming part of the forest preserve) shall be unpaid on the day on or before which the tax collector of any town in which such lands shall be situated, should, according to law, pay over moneys collected by him to the county treasurer, then it shall thereafter, and until such tax is paid, or, in default of such payment, until the title to such lands is conveyed by the Comptroller after a sale thereof for unpaid taxes, be unlawful for any person, whether owner, occupant or otherwise, to cut, injure, bark or remove therefrom any trees or timber, whether standing or felled. Any person not expressly permitted by law, who shall thereafter so cut, injure, bark or remove any such tree or timber shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof, suffer a fine not exceeding two hundred and fifty dollars, or imprisonment not exceeding three months, or both, in the discretion of the court; and he shall be liable as for trespass in a civil action brought by the Forest Commission in the name or on behalf of the people of the State for damages, and to arrest and to imprisonment upon execution, in all respects as provided in section fourteen of chapter of the laws of eighteen hundred and eighty-five, entitled "An act for the preservation and care of the Adirondack forest," as to either of the actions therein mentioned. Upon learning that any trees or timber are being so cut, injured, barked or removed from any such lands after any tax thereon is so unpaid, it shall be the duty of the Forest Commission to bring, in the name or on behalf of the people of the State, an action to restrain such cutting or removal, and in such action the court shall, upon due application, grant preliminary and final injunctions restraining the continuance of such cutting, injury, barking or removal, and such action shall proceed and be conducted in all respects as provided in sections fourteen and fifteen of the said act entitled "An act for the preservation and care of the 'Adirondack forest.'"

§ 4. The assessors of all the towns within the counties mentioned

in section first of this act shall assess forest lands separately, and shall describe and specify all forest lands, whether or not forming the whole or only a part of any tract, farm or holding, within their respective towns separately upon the assessment-rolls before completing the same. The Comptroller shall prepare and submit to such assessors forms for such description and specification, which forms such assessors shall follow. The boards of supervisors of the said counties shall, in any alterations they may make in the assessment-rolls pursuant to law, take care that the separate description and specification of forest lands are properly made and preserved.

§ 5. In the assessment to be made in the year eighteen hundred and eighty-five, and thereafter, of forest lands within the counties mentioned in section first of this act, and in all proceedings upon such assessments, or to levy or collect taxes upon such forest lands, or in the payment of taxes thereon, or in the return of such forest lands for unpaid taxes, or in any proceedings by reason of the payment or the non-payment of such taxes, or in the sale of any such lands for unpaid taxes, or any proceedings in or by reason of any such sale, or of the conveyance of property therefor, there shall be no distinction or difference between the lands of residents and non-residents; and excepting as herein otherwise provided, all the said assessments, payments, return and proceedings whatsoever shall be had as now provided by law in the case of non-resident owners.

§ 6. The collector of each of the said towns upon first delivering to the county treasurer any account of unpaid taxes shall specify thereon the forest lands therein described upon which the taxes are unpaid. The county treasurer shall thereupon, in addition to his other duties with respect thereto prescribed by law, compare such specification with the original assessment-roll; and if the county treasurer find such specification to be as to such forest lands a correct transcript of the said assessment-roll, he shall add to it a certificate which may form part of the certificate first mentioned in section fourth of chapter four hundred and twenty-seven of the laws of eighteen hundred and fifty-five, showing that he has examined and compared the specification of the said forest lands upon which the taxes are unpaid with the assessment-roll and found the same to be correct; and in transmitting the collector's account to the Comptroller, as now provided by law, the county treasurer shall in his certificate state that he has so examined and compared the specification of the said forest lands with the entries of the said lands in the original assessment-roll, and has found the same to be a true transcript of such roll.

§ 7. Taxes assessed upon forest lands within the said towns and not paid prior to the transmitting of the collector's account to the Comptroller as mentioned in the preceding section shall thereafter be paid only to the Comptroller, who upon such payment, if made prior to the statement of the account of the county treasurer for the year, shall credit the county treasurer with the amount so paid.

§ 8. The Comptroller forthwith, upon receiving the account of unpaid taxes on forest land as mentioned in section sixth of this act, shall prepare a separate list or statement of all such forest lands within each of the said counties and included in the said account, together with the amount due on the various tracts or holdings thereof respect-

ively for unpaid taxes and interest and charges, if any. The Comptroller shall then forthwith transmit to the county treasurer of each of the said counties the list or statement relating to forest lands within such county, together with a notice addressed generally to owners of forest lands (but not naming the owners), stating that so much of the said forest lands as may be necessary to discharge the taxes, interest and charges which may be due thereon at the time of sale will, on a day in the succeeding August and the succeeding days, be sold at public auction at the Capitol in the city of Albany. If, in the judgment of the Comptroller, the sale cannot advantageously or justly be held in August, then the notice may specify some day later than August. The Comptroller may at any time withdraw such a notice of sale, and transmit to the county treasurer a new notice for as early a day as he may deem to be consistent with the interests of the State.

§ 9. The Comptroller shall cause to be published the said list or statement of forest lands upon which the taxes are so unpaid in each county, together with the notice mentioned in the section next preceding, in the newspapers in which the list or statement mentioned in section thirty-fourth of chapter four hundred and twenty-seven of the laws of eighteen hundred and fifty-five is now required to be published in or for such county, excepting that the selection of newspapers or the ascertainment of the newspapers, most generally circulated in such county, shall be made by the Comptroller instead of by the county treasurer, and excepting that if the proprietor or manager of any newspaper shall decline or omit to make such publication, or shall make the same incorrectly, then the Comptroller may withdraw such notice, and may in such newspaper as the Comptroller may designate as proper recommence the publication of the notice or commence the publication of a new notice. Each such publication shall be made once a week for ten weeks; and the first publication shall be made not less than ten weeks before the date of sale therein mentioned. Every proprietor, manager, or printer of a newspaper to whom such notice shall be transmitted for publication, and any other person having knowledge of the publication upon being requested by the Comptroller, shall, within two days after the last publication thereof, transmit to the Comptroller an affidavit of due publication, made by some person to whom the fact of publication shall be known; and every such person shall upon being requested so to do make such affidavit.

§ 10. Every purchaser, except the Comptroller or the Forest Commission, shall at the time of purchase pay in cash to the Comptroller such proportion of the purchase-money as the Comptroller may specify, and the remainder of the purchase-money shall be paid within forty-eight hours of the time of sale, or the premises shall be resold by the Comptroller and the amount paid by the purchaser shall be forfeited to the State. Such resale shall require no further notice of sale; but the Comptroller may, after the sale or resale of the last parcel and upon an oral or written notice, at the time of adjournment, adjourn the sale for forty-eight hours or more, for a resale of such of the premises as were sold to purchasers who shall not have fully paid therefor.

§ 11. It shall be the duty of the Forest Commission to attend or be represented upon every such sale, and to make in the name and on

behalf of the people of the State such bids and purchases thereon as it may deem for the advantage of the State, providing, however, that no payment shall be required from the Forest Commission or the people of the State upon any such bid or purchase, excepting for the sum by which the bid of the Forest Commission shall exceed the amount of taxes, interest and charges for which the property bid for was advertised to be sold, and providing that if the bid of the Forest Commission be for any larger sum than the said amount of taxes, interest and charges, then the bid or purchase shall not be binding or final unless and until the Legislature, not later than at its then next regular session, provide for the payment of so much of the sum so bid as shall be in excess of the said amount of taxes, interest and charges; and providing, further, that if the Legislature do not so make such provision, then such bid and purchase shall be void, and the property shall, without prejudice, be resold by the Comptroller at the next or some succeeding sale of forest lands held in the county in which the property is situated, for unpaid taxes, under the provisions of this act, such resale to be had in all respects in like manner and upon like notice as that in and upon which such next sale is had.

§ 12. Any owner, or any person acting or assuming to act for any owner, or any incumbrancer of forest lands within the said counties may register his name, together with a description of his lands, with the Comptroller, and a place to which notices relating to the said lands may be sent.

§ 13. A redemption of lands so purchased by the Forest Commission may be made only by the owner of the lands, or by some one having an interest in or claim to the lands derived from the owner, upon the payment to the Comptroller of the amount so bid, together with interest thereon from the date of sale, at the rate of ten per cent per annum, and an amount to be fixed by the Comptroller to be thereafter paid by him to the Forest Commission to reimburse the Forest Commission for such expenses as it may have incurred in advertising, posting or sending notices.

§ 14. The Forest Commission, as soon as practicable after the receipt from the Comptroller of the certificate of sale, now provided by law, which certificate the Comptroller shall deliver to the Forest Commission, shall cause to be published in some newspaper to be designated by the Comptroller as being best calculated to give notice within the county in which the lands are situated, a copy of the certificate, together with a notice that on or after a date, to be fixed by the Forest Commission, but which shall not be less than three months after the first publication of the notice, nor before a full year from the date of the delivery to the town collector of the warrant for the collection of the tax for which the sale was had upon which the certificate was delivered, the Forest Commission will apply to the Comptroller for a deed of the premises sold upon the said sale to the people of the State. Such notice shall be published, once a week, for ten weeks. The Forest Commission shall also cause a copy of the said certificate and notice to be personally delivered or sent by mail, postage prepaid, directed to any person who shall have made the registry mentioned in section twelve of this act, at the place mentioned in such registry. The Forest Commission shall also cause a copy of the said certificate

and notice to be posted upon the land sold, or at two or more conspicuous places in the neighborhood, or within the town in which the lands are situate.

§ 15. At or after the date mentioned in the notice mentioned in the section next preceding, the Forest Commission shall, upon filing with the Comptroller affidavits reasonably establishing the fact that a copy of the certificate of sale, with the said notice, was published, posted, and delivered or mailed, as mentioned in the section next preceding, more than three months before the time of application, be entitled to receive from the Comptroller a deed to the people of the State of New York of the lands described in the said certificate, providing, however, that no such deed shall be delivered within one year after the date of the delivery to the town collector of the warrant for the collection of the tax for which the sale was had upon which the certificate was delivered. The consideration expressed in the deed shall be the amount for which the property therein described was sold. The said deed shall vest in the people of the State an absolute estate in fee-simple in the said lands.

§ 16. During one year after its execution, a deed executed by the Comptroller to the people of the State, which purports to be executed in pursuance of the provisions of this act, shall be presumptive evidence of the title of the grantee and of all persons claiming under him, and presumptive evidence that the deed was in all respects duly and rightfully and at the lawful time executed and valid ; that the notice or notices mentioned in the two last preceding sections were published, posted and delivered or mailed, and in all respects given in the manner and place and at the lawful time in said sections specified ; that the sale of the premises was in all respects conducted duly and rightfully upon proper notice and at the lawful time ; that the list or statement and notice mentioned in section eighth of this act were duly, rightfully and at the lawful time prepared, transmitted and published, as in this act provided ; that the taxes for the non-payment of which the said sale was had, or purported to be had, were rightfully and duly and at the lawful time by the lawful officers or authority levied upon the lands mentioned in the said deed ; and that in all other respects all the acts and proceedings prescribed by or in pursuance of law as proper or necessary to precede any assessment, levy of taxes, sale or the delivery of such deed were rightfully and in lawful time had and completed.

§ 17. An action may, upon service of the summons therein upon the Forest Commission, be brought in the Supreme Court against the people of this State to set aside any deed heretofore executed and purporting to be executed upon any sale for unpaid taxes to the people of the State, of any premises within the counties mentioned in section first of this act, or to any person through whom the people of the State have derived or claimed any title to such premises, or to set aside any deed hereafter executed to the people of this State executed or purporting to be executed upon any sale for unpaid taxes, providing, however, that any such action to set aside a deed heretofore executed may be brought only within one year after the passage of this act and not later, and providing that any such action to set aside a deed hereafter executed may be brought only within one year after

the date of such deed and not later, and providing further that no such action shall be maintained, unless before the commencement thereof the plaintiff deposit with the Comptroller the amount expressed in the deed as the consideration for which the same was executed; or, if only nominal consideration be expressed, then the amount of unpaid taxes, interest and expenses for which the property was sold, together with interest at the rate of ten per centum per annum upon such amount from the date of the sale upon which the deed was given, and unless the complaint in the action shall allege that such deposit has been made, subject to the provisions of this act. Upon the plaintiff's discontinuance of such action, or upon a final judgment therein against the plaintiff, and the plaintiff's stipulation, duly acknowledged, not to appeal therefrom, which stipulation shall bind the plaintiff and his successors in interest, the Comptroller shall repay the money so deposited to the plaintiff or his representative. Upon the plaintiff's final success in such action, the Comptroller shall apply the amount so deposited in payment and satisfaction of the taxes, for non-payment of which the deed was given. Upon the trial of such action the plaintiff shall succeed, if he affirmatively show that there was a substantial failure to comply with any provision of law relating to the assessment, levy of the tax, sale and delivery of the deed, or to the notices to be given of any proceeding with relation thereto; but no informality or irregularity shall, in the case of any deed hereafter executed, be sufficient for the success of the plaintiff, unless the court shall find and adjudge that the same was in a substantial matter, and that the plaintiff has suffered by reason thereof.

§ 18. As to every deed of premises within the said counties heretofore executed, upon any sale for unpaid taxes, to the people of the State, or to any person through whom the people of the State have derived or claimed any title to such premises, the same shall, after one year from the passage of this act — and as to every deed of such premises hereafter executed or purporting to be executed to the people of the State upon any sale for unpaid taxes, the same shall, after one year from the execution thereof, be conclusive evidence of the title of the grantee, and that the deed was in all respects duly and rightfully and at the lawful time executed and valid; that in all respects all the acts and proceedings prescribed by or in pursuance of law as proper or necessary to precede any assessment, levy of taxes, sale or the delivery of such deed were rightfully and in lawful time had and completed; and as to deeds hereafter purporting to be executed pursuant to the provisions of this act, that the notice or notices mentioned in sections fourteen and fifteen hereof were published, posted and delivered or mailed and in all respects given in the manner and place and at the lawful time in the said sections specified, that the sale of the premises was in all respects conducted duly and rightfully upon proper notice and at the lawful time, that the list or statement and notice mentioned in section eighth of this act were duly, rightfully and at the lawful time prepared, transmitted and published as in this act provided, and that the taxes for the non-payment of which the said sale was had or purported to be had were rightfully and duly and at the lawful time and by the lawful officers or authority, levied upon the lands mentioned in the said deed. Providing, how-

ever, that the provisions of this section shall not deprive the plaintiff in any action brought as provided and within the time prescribed in section seventeen of this act, of any relief to which he would otherwise be entitled in such action.

§ 19. All the provisions of law now in force as to assessment, the levying and collection of taxes, proceedings for the non-payment thereof, sales therefor, and conveyances thereupon, shall, so far as applicable and excepting as modified by this act, be deemed to relate to every assessment, levying and collection of taxes, proceedings for the non-payment thereof, sales therefor and conveyances thereupon mentioned in this act.

§ 20. All acts and parts of acts inconsistent with this act are, so far as so inconsistent, hereby repealed.

§ 21. This act shall take effect immediately.

ASSEMBLY, No. 37.

MEMBERS, OFFICERS AND REPORTERS OF THE ASSEMBLY, WITH THEIR POST-OFFICE ADDRESS, AND BOARDING PLACES IN ALBANY.

MEMBERS OF ASSEMBLY.

Hon. GEORGE Z. ERWIN, *Speaker*, Potsdam, St. Lawrence county; Residence in Albany, Delavan House.

District.	NAME.	Post-office address.	County.	Residence in Albany.
2	Andrews, Harlan P.....	Cuyler.....	Cortland.....	162 Hamilton street.
	Arnold, Frank B.....	Unadilla.....	Otsego.....	Delavan House.
5	Bailey, Lucien R.....	Batavia.....	Genesee.....	60 Chapel street.
2	Baker, Amos H.....	Hamburg.....	Erie.....	American House.
2	Baker, Charles D.....	Corning.....	Steuben.....	126 State street.
	Baker, Charles K.....	North Granville.....	Washington ..	4 Pine street.
	Barager, Charles F.....	Candor.....	Tioga.....	23 Lodge street.
	Barnes, Wesley	Olmsteadville.....	Essex.....	11 Elm street.
21	Barnum, Henry A.....	New York City.....	New York....	97 Columbia street.
	Bartley, Addison H.....	Gilboa.....	Schoharie	Globe Hotel.
	Berry, Alden W.....	Gloversville.....	Fulton.....	51 Chapel street.
5	Brennan, Michael.....	18 Grand St., New York City.....	New York....	19 Park street.
1	Briggs, Daniel C.....	Malta.....	Saratoga.....	136 State street.
	Budlong, John M.....	West Schuyler.....	Herkimer.....	American Hotel.
2	Burnham, Edwin K.....	Newark.....	Wayne.....	38 Lodge street.
	Byrne, Frank.....	Glens Falls...	Warren	Delavan House.
23	Cantor, Jacob A.....	132 East 105th St., New York.....	New York ...	Delevan House.

MEMBERS OF ASSEMBLY—Continued.

District.	NAME.	Post-office address.	County.	Residence in Albany.
1	Carlisle, Samuel L.....	Newburgh	Orange.....	144 State street.
5	Cartwright, Silas S	Roxbury	Delaware.....	162 Hamilton street.
8	Coffey, Michael J.....	97 William St., Brooklyn.....	Kings.....	Delavan House.
1	Connelly, Robert E.....	101 Elm St., Brooklyn.....	Kings.....	92 Colmbia street.
	Church, Louis K.....	Hicksville.....	Queens.....	142 State street.
	Clark, Hiland K.....	Groton	Tompkins....	37 Chestnut street.
	Clark, William B.	Waterloo.....	Seneca.....	Delavan House.
	Cole, Fremont.....	Watkins.....	Schuyler.....	126 State street.
1	Curtis, N. Martin.....	Ogdensburg	St. Lawrence..	48 Chapel street.
	Cutler, Edward D.....	Schenectady.....	Schenectady..	Windsor.
	Decker, James D.....	Pond Eddy.....	Sullivan.....	Stanwix Hall.
2	Demers, Eugene L.....	Lansingburgh.....	Rensselaer....	Lansingburgh.
	Dibble, J. Marshall.....	Hindsburgh	Orleans	Globe Hotel.
	Driess, Jacob A.....	Lockport.....	Niagara.....	Belvedere House.
12	Earl, Mortimer C.....	699 Quincy St., Brooklyn ...	Kings.....	American Hotel.
3	Eiseman, Charles.....	294 Bowery, New York City.....	New York ...	Delavan House.
1	Ely, W. Caryl.....	East Worcester.....	Otsego.....	142 State street.
3	Erwin, Geo. Z. (speaker).	Potsdam.....	St. Lawrence..	
1	Farnum, Ammon S.....	Savannah.....	Wayne.....	60 Chapel street.
6	Farrell, Thomas F.....	31 Orient St., Brooklyn, E. D ...	Kings.....	63 Maiden Lane.
	Felter, John W.....	Haverstraw.....	Rockland.....	136 State street.
1	Finn, Daniel E.....	142 Franklin St., New York.....	New York ...	Delavan House.
3	Garbutt, Phillip.....	Garbutt.....	Monroe.....	Globe Hotel.
23	Gerety, Joseph L.....	New York City.....	New York....	Delavan House.
2	Giese, Frank M.....	Buffalo.....	Erie.....	Belvedere House.

2	Gould, G. Henry P.	Lyons Falls.	Lewis.	Delavan House.
2	Greene, George W.	Goshon	Orange	Stanwix Hall.
6	Grippen, Bartlott B. . . .	Saratoga Springs.	Saratoga	American Hotel.
4	Hagan, Edward P.	321 East 20th street, New York. .	New York	Delavan House.
20	Haggerty, Henry F.	184 Navy street, Brooklyn.	Kings.	92 Columbia street.
3	Haggerty, James.	141 East 50th street, New York . .	New York . . .	136 State street.
4	Hardenburgh, C. A. J. . . .	Pine Bush, Orange Co.	Ulster.	249 North Pearl.
2	Hardin, Terence I.	West Troy.	Albany.	West Troy.
	Habbrook, Gilbert D. B. . .	Port Ewen.	Ulster	21 Jay street.
3	Haskell, Edward F.	Morrisville.	Madison.	219 Lancaster street.
11	Hawkins, Simeon S.	Jamesport.	Suffolk.	Kenmore.
2	Hawkins, William M.	Buffalo	Erie	American Hotel.
1	Heath, Henry.	142 Macon street, Brooklyn	Kings.	144 State street.
1	Hendricks, Francis.	Syracuse.	Onandaga	Delavan House.
1	Hogeboom, John C.	Hudson	Columbia . . .	Delavan House.
1	Hookey, James P.	Troy.	Rensselaer.	Troy.
1	Hopkins, Stephen T.	Catskill.	Greene	Kenmore.
2	Horton, Dana P.	Findley's Lake.	Chautauqua. . .	Delavan House.
2	Hotaling, Lansing.	74 State street, Albany	Albany.	390 Madison avenue.
1	Horne, Walter P.	Suspension Bridge.	Niagara.	Stanwix Hall.
11	Howe, Henry C.	Fulton	Oswego	Globe Hotel.
3	Howe, Walter.	185 Madison ave., New York.	New York.	270 State street.
19	Hubbell, Walter S.	98 & 99 Powers Bl'k, Rochester. . .	Monroe.	Delavan House.
4	Husted, James W.	Peekskill.	Westchester. . .	4 Pine street.
2	Ives, Eugene S.	69 Wall street, New York.	New York.	Delavan House.
18	Jackson, Timothy W.	Akron	Erie	216 State street.
1	Johuson, Samuel W.	Mamaroneck.	Westchester. . .	Kenmore.
14	Kenny, John F.	220 East 35th street, New York. . .	New York.	19 Park street.
1	Kilby, Allen E.	Carthage.	Jefferson	Kenmore.
1	Kruse, Frederick W.	Olean	Cattaraugus . .	Delavan House.
14	Kunzenman, Jacob.	329 East 11th street, New York. . .	New York.	Delavan House.

MEMBERS OF ASSEMBLY — Continued.

Dist. No.	NAME.	Post-office address.	County.	Residence in Albany.
7	Liddle, Thomas.....	Amsterdam.....	Montgomery..	Delavan House.
	Lindsey, George H.....	Brooklyn, E. D.....	Kings.....	Stanwix Hall.
3	Livingston, Robt. A.....	Garrisons.....	Putnam.....	Kenmore.
	Lodewick, Charles C.....	Greenbush.....	Kensselaer....	Greenbush.
3	Lowing, John E.....	Silver Springs.....	Wyoming.....	Globe Hotel.
1	McCann, Peter K.....	338 DeGrand street, Brooklyn...	Kings.....	19 Park street.
	McClelland, Charles P...	Dobbs Ferry	Westchester ..	5 Pine street.
15	McEwen, William R.....	Wellsville	Allegany.....	5 Pine street.
3	McGoldrick, John B.....	427 West 30th street, New York..	New York.....	19 Park street.
9	Murray, Patrick.....	Albany.....	Albany.....	176 Orange street.
2	Myers, Lewis A.....	84 North Oxford street, Brooklyn.	Kings.....	12 Jay street.
2	Nagle, Richard.....	103 Prospect street, Brooklyn....	Kings.....	92 Columbia street.
1	Nash, Eugene A.....	Little Valley.....	Cattaraugus..	American Hotel.
17	Niles, Stephen H.....	Coeymans.....	Albany.....	Delavan House.
	O'Hara, John H.....	459 West 44th street, New York..	New York....	Delavan House.
2	Olin, William H.....	Binghamton.....	Broome.....	21 Jay street.
2	Oliver, James.....	94 Center street, New York.....	New York....	Delavan House.
3	O'Neil, William T.....	St. Regis Falls.....	Franklin.....	84 Lancasster street.
	Osborne, Edward B.....	Poughkeepsie.....	Dutchess.....	222 Lark street.
1	Owens, T. James.....	Steuben.....	Oneida.....	Dunlop House.
6	Palmer, George W.....	Plattsburgh.....	Clinton	184 State street.
4	Priddy, Willoughby B...	Spring Lake.....	Cayuga.....	40 Lodge street.
	Raines, John.....	Canandaigua	Ontario.....	Delavan House.
	Reilly, Edward F.....	25 Ridge street, New York.....	New York....	Delavan House.
	Roche, Patrick H.....	87 Market street, New York.....	New York....	Delavan House.

9	Rockefeller, John P.....	295 West 11th street, New York..	New York.....	Kenmore.
10	Roesch, George F.....	19 Avenue A, New York.....	New York.....	33 Beaver street.
12	Rosenthal, S. D.....	411 East Houston St., New York.	New York....	Delavan House.
1	Scott, George.....	Ft. Edward.....	Saratoga.....	14 Park street.
	Scott, Kidder M.....	Geneseo.....	Livingston...	157 Hamilton street.
2	Seeber, Eli J.....	Depauville.....	Jefferson.....	23 Lodge street.
24	Shea, John B.....	Fordham.....	New York....	Delavan House.
1	Sheehan, William F.....	83 Franklin street, Buffalo...	Erie.....	American House.
2	Sherman, Lewis B.....	Rome.....	Oneida.....	Dunlop House.
3	Shoemaker, Conrad.....	Manlius Station.....	Onondaga.....	Stanwix Hall.
8	Smith, Charles..	29 Bowery, New York.....	New York....	Delavan House.
	Smith, Clark E.....	Dundee.....	Yates.....	American Hotel.
2	Smith, Thomas A.....	Freeport, L. I.....	Queens....	Hotel Brunswick.
1	Snyder, Robert A.....	Saugerties.....	Ulster.....	Globe Hotel.
1	Steber, Henry A.....	Utica.....	Oneida.....	Dunlop House.
1	Storm, Joseph H.....	Green Haven.....	Dutchess.....	Kenmore.
2	Sweet, Gouveneur M.....	Phoenix.....	Oswego.....	94 Lancasters treet.
	Tappan, Wallace.....	Baldwinsville.....	Onondaga.....	94 Lancaster street.
1	Taylor, James.....	112 11th street, Brooklyn...	Kings.....	86 Lancaster street.
10	Tuck, Andrew.....	Flackville.....	St. Lawrence..	64 Chapel street.
2	Tumilty, James P.....	Rochester.....	Monroe.....	214 State street.
	Tynan, Michael S.....	Stapleton, L. I.....	Richmond....	American House.
7	Van Allen, Lucas L.....	318 Broadway, New York.....	New York....	Delavan House.
2	Van Buskirk, M. B.....	Geneva.....	Cayuga.....	40 Lodge street.
	Van Duzer, Jonas S.....	Horseheads.....	Chemung.....	84 Lancaster street.
1	Wafer, Moses J.....	124 Harrison street, Brooklyn...	Kings.....	19 Park street.
1	Whiteman, George E.....	Wayland.....	Steuben.....	Mansion House.
1	Whitmore, George B.....	Sherburne.....	Chenango.....	Cor. Eagle & Lancaster streets.
2	Williams, Julien T.....	Dunkirk.....	Chautauqua..	Delavan House.
13	Windolph, John P.....	280 West 25th street, New York..	New York....	Kenmore.

OFFICERS OF THE ASSEMBLY.

NAME.	Office.	County.	Home post-office.	Residence in Albany.
Charles A. Chickering..	Clerk.....	Lewis.....	Copenhagen.....	105 Lancaster street.
Henry E. Abell.....	Assistant Clerk.....	Schoharie....	Esperance.....	Globe Hotel.
Almon C. Greeno.....	Journal Clerk.....	Wayne.....	Palmyra.....	American Hotel.
Jacob Shaver Jr.....	Deputy Clerk.....	Erie.....	Buffalo.....	Globe Hotel.
George M. Bullock.....	Deputy Clerk.....	Columbia....	Hillsdale.....	Delavan House.
Cyrus Lawrence.....	Deputy Clerk.....	Westchester..	South Salem.....	Globe Hotel.
James S. Mitchell.....	Deputy Clerk.....	Lewis.....	Copenhagen.....	American Hotel.
James H. Manville.....	Deputy Clerk.....	Washington..	Whitehall....	Globe Hotel.
Dan. S. Griffin.....	Deputy Clerk.....	St. Lawrence..	Heuvelton.....	48 Chapel street.
William H. Barker.....	Deputy Clerk.....	Kings.....	534 Bedfd a., Bkn.	Kenmore.
William L. Parkhurst..	Deputy Clerk.....	Ontario.....	Clifton Springs...	American Hotel.
Warren W. Cummings..	Bank Messenger.....	Lewis.....	Copenhagen.....	15 Chestnut street.
Claudio Mitchell.....	Clerk's Messenger.....	Tompkins....	Ithaca.....	17 Lancaster street.
Charles S. Brightmyer..	Clerk's Messenger.....	Albany.....	Albany.....	95 Central avenue.
Jonathan K. Peck.....	Librarian	Tioga.....	Owego.....	Mansion House.
David Robinson.....	Assistant librarian	Putnam.....	Cold Spring.....	84 Swan street.
Emery P. Close.....	Stenographer.....	Erie.....	Buffalo.....	435 Clinton avenue.
William N. Haskell.....	Speaker's Clerk.....	Albany.....	Albany.....	341 Madison avenue.
William Wolf, Jr.....	Speaker's Messenger.....	Saratoga.....	Waterford.....	Waterford.
Edward H. Talbot.....	Sergeant-at-Arms.....	Essex.....	Olmsteadville.....	Stanwix Hall.
Michael Maher.....	D'rk'per & Asst. Ser.-at-Arms	Orange.....	Highland Falls...	31 Eagle street.
Hermion F. Fox.....	1st Assistant Doorkeeper.....	Ontario.....	Geneva.....	Hotel Brunswick.
Hamilton S. Preston...	2d Assistant Doorkeeper.....	Delaware.....	Stamford.....	149 Hamilton street.
James McW. Getty....	Assistant Doorkeeper.....	Washington..	West Hebron.....	Mansion House.
Peter Welch.....	Assistant Doorkeeper.....	Greene.....	Catskill.....	67 Washington avenue.

Orrin Holden.....	Assistant Doorkeeper.....	Broome.....	Maine.....	Mansion House.
Stephen A. Smith.....	Assistant Doorkeeper.....	New York.....	New York.....	
Edward H. Abram.....	Assistant Doorkeeper.....	St. Lawrence..	Parishville	211 State street.
John Christie.....	Assistant Doorkeeper.....	Fulton.....	Gloversville	Globe Hotel.
Edward A. Poole.....	Janitor.....	Albany.....	Albany.....	
Minor McDonald.....	Assistant Janitor.....	Cayuga.....	Fair Haven.....	96 Livingston avenue.
William P. Dodge.....	Postmaster.....	Oneida.....	Prospect	Dunlop House.
Hiram W. Wakely.....	Assistant Postmaster.....	Allegany.....	Black Creek.....	Mansion House.
Garrett S. Warner.....	Superintendent of Documents.	Oswego.....	Pulaski.....	Globe Hotel.
W. D. McKinstry.....	Clerk Com. Ways and Means..	Chautauqua..	Fredonia.....	Cor. Eagle & Lancaster.
Garrit S. Van Wie.....	Clerk Committee on Judiciary.	New York.....	New York City...	30 Jay street.
William J. Trimble	Clerk Committee on Cities...	New York.....	New York City...	97 Columbia street.
William N. Henderson..	Clerk Committee on Railroads.	Madison.....	Morrisville	60 Chapel street.
Lynde Palmer	General Committee Clerk	Clinton.....	Plattsburgh	184 State street.
Myron C. Gallup.....	General Committee Clerk	Chautauqua ..	Findley's Lake....	Cor. Eagle & Lancaster.
John E. Overton.....	General Committee Clerk	Suffolk.....	Port Jefferson.....	Kenmore.
Anderson D. Lawrence..	General Messenger	Albany.....	Albany.....	102 Herkimer street.
C. J. Bellingr.....	General Messenger	Jefferson.....	Watertown	78 Chapel street.
Edward Whiteman	General Messenger	Rensselaer....	Troy.....	
William E. Jones	Post-office Messenger.....	Cattaraugus ..	Sandusky	42 La Fayette street.

REPORTERS OF THE ASSEMBLY. •

NAME.	Paper.	County.	Home Post-Office.	Residence in Albany.
Charles J. Hailes,....	Associated Press and Albany Argus.....	Albany.....	Albany.....	413 State street.
George F. Spinney...	New York Times.....	New York....	New York....	84 Lancaster st.
Edgar L. Murlin.....	New York Tribune.....	New York....	New York....	159 Lancaster st.
Thomas J. Cummins.	New York Herald.....	New York....	New York....	Kenmore.
Hiram Calkins.....	New York Graphic.....	New York....	New York....	Delavan House.
John W. McDonell ..	New York World.....	New York....	New York....	Mansion House.
Julian E. Ralph.....	New York Sun	Kings.....	Brooklyn.....	84 Lancaster st.
Alexander McBride...	Albany Evening Journal.....	Albany.....	Albany.....	72 Lark st.
Harry J. Hastings....	Albany Morning Express	Albany.....	Albany.....	165 Hamilton st.
Maurice F. Holahan ..	New York Star.....	New York....	New York....	Delavan House.
H. D. Cunningham ..	New York Evening Post and Utica Herald.	Albany.....	West Troy....	153 Union st.W.T.
Frederic G. Mather...	Buffalo Express and Rochester Dem. & Ch.	Albany.....	Albany.....	99 Lancaster st.
Lyman B. Smith.....	Buffalo Commercial Advertiser ..	Erie.....	Buffalo.....	Delavan House.
James W. Stanley....	Rochester Post Express & Buffalo Courier.	Monroe.....	Rochester ...	78 Chapel street.
Myron H. Rooker....	Albany Press and Knickerbocker.....	Albany.....	Albany.....	294 Madison ave.
Charles G. Shanks....	Albany Evening Times.....	Albany.....	Albany.....	127 Dove street.
R. M. Griffin	Albany Evening Post.....	Albany.....	Albany.....	238 Hamilton st.
Timothy J. Dyson....	Brooklyn Union.....	Kings.....	Brooklyn....	7 Lancaster st.
John Cogan.....	Brooklyn Daily Times.....	Kings.....	Brooklyn,E.D.	1 Lancaster st.
George E. Eaton.....	Troy Press.....	Rensselaer...	Troy.....	Troy.
Reginald J. Schroeder.	New York Staats Zeitung.....	Kings.....	Brooklyn,E.D.	Belvedere House.
J. S. Ryan	Associated Labor Press.....	Albany.....	Albany.....	
Desmond S. Lamb....	United Press.....	Albany.....	Albany.....	70 Myrtle ave.

STATE OF NEW YORK.

No. 38.

IN ASSEMBLY,

JANUARY 26, 1885.

ANNUAL REPORT OF THE STATE ENGINEER AND SURVEYOR.

OFFICE OF THE STATE ENGINEER AND SURVEYOR, }
ALBANY, N. Y., *January 26, 1885.* }

Hon. GEORGE Z. ERWIN,

Speaker of the Assembly :

SIR — I have the honor to transmit herewith my report relative to the State canals for the fiscal year ending September 30, 1884.

Very respectfully,

your obedient servant,

E. SWEET, .

State Engineer and Surveyor.

REPORT

STATE OF NEW YORK:

OFFICE OF THE STATE ENGINEER AND SURVEYOR, }
ALBANY, *January 20, 1885.*

To the Legislature :

In compliance with law I have the honor to submit to you the following report of this department for the past year:

1. OPERATIONS OF THE CANAL.

The business of the canals has shared in the depression which has been common to all the industrial movements and enterprises of the country during the past year. The total amount of freight moved on the State canals during the season of navigation just closed was 5,009,488 tons, and comprised the following articles ; products of the forest 1,671,706 tons, products of agriculture 1,264,237 tons, products of manufacture 205,006 tons, merchandise 300,450 tons, other articles 1,568,059 tons. Total 5,009,488 tons.

This tonnage is less than that moved on the canals last year by 654,588 tons. Not only has the volume of canal freight diminished, but the rates of freight have been unprecedentedly low during the last season. In both these respects, however, the canal business suffers in common with the railroads which compete for the same freights and to whose warfare among one another may be attributed the lowest freight tariff ever known.

The reported operations of the New York Central Railroad for 1884, shows 688,024 tons less freight than in 1883, and the New York and Erie 2,538,685 tons less freight than in 1883.

A new railroad line, the West Shore, competing for the same business has, however, been opened within the past year, but its whole tonnage was much less than one-third the loss of freight suffered by the Central and the Erie roads.

The average rate of freight on these roads for all classes of articles shipped was, in 1884, .740 of a cent per ton per mile, against .845 of a cent per ton in 1883. The average rate of canal freight during 1884, was .27 of a cent per ton per mile against .340 of a cent per ton in 1883. The canal has suffered and the public temporarily gained by one of those periodic railroad wars brought on in part by new rivalries and in part by the fact that the meager crops in 1883 and the bad market of 1884 made the volume of business too small to permit them all to be prosperous and contented. The total earnings of all the railroads of the State for the past year have been in round numbers \$126,204,000 against \$133,980,000 for 1883. The charges against earnings other than dividends were for 1884, \$118,800,000 against for 1883, \$114,027,000. Thus the earnings decreased \$7,576,000, and the expenses increased \$4,473,000, showing an aggregate loss compared with the operations of 1883, of \$12,549,000, or nearly ten per cent of the gross operations of the railroads of the State, though over \$44,000,000 had been added to the railroad capital in the State during the year.

The following table shows the tonnage of the canal and of the railroads competing with the canal for the last twenty years:

Table showing the annual tonnage of the canal and competing railroads from 1865 to 1885:

	Canal — Tons.	Railroads — Tons.
1865.....	4,729,654	3,609,640
1866.....	5,775,220	4,844,989
1867.....	5,688,325	5,152,472
1868.....	6,442,225	5,754,842
1869.....	5,859,080	6,594,094
1870.....	6,173,769	8,974,505
1871.....	6,467,888	9,376,264
1872.....	6,673,370	9,958,239
1873.....	7,364,782	11,835,426
1874.....	5,804,588	12,478,954
1875.....	4,859,858	12,241,900
1876.....	4,172,129	12,776,498
1877.....	4,955,963	12,533,807
1878.....	5,171,320	13,845,981
1879.....	5,362,372	17,228,394
1880.....	6,457,652	19,248,930
1881.....	5,179,192	22,678,202
1882.....	5,467,423	23,225,631
1883.....	5,664,056	24,503,063
1884.....	5,009,488	22,123,895

It must be borne in mind that the average haul of rail freights is much shorter than those by canal; the former on the through New York lines average considerably less than 200 miles, while the canal freights, being mostly through, are at least twice as long so that a table of gross tonnage does not fairly represent the comparative business of the routes and favors the railroads to the extent of about fifty per cent.

These statistics, though they show that the canal has ceased to occupy the leading position as a freight carrier which it held twenty years ago, indicate a uniformity and persistence in the volume of its business, illustrating forcibly the importance of water carriage when we consider that during this period the development of railway transportation has absorbed the skill and resources of the engineering profession, the best executive and administrative talent, and so much of the capital of the country, while the canal has remained unimproved and unchanged as to its structure, its equipment and its modes of operation.

2. NAVIGATION.

The canals were opened on the 6th day of May and closed on the 1st day of December, 1884. With the exceptions of the detentions due to the breaks hereafter described and the scarcity of water on the Rome level occasioned by the lack of storage capacity at Forestport, the navigation of the canals has been uninterrupted during the last season, as is shown by the unusually quick passages made by boats during the season.

3. WATER SUPPLY.

Owing to the diminished summer flow of the streams supplying water to the middle and eastern divisions, and the fact that nearly all the streams flowing from the water sheds available for their supply have been brought under contribution and have for several years barely sufficed to keep the levels supplied, the subject of water supply has become of vital importance. Though very thorough methods were adopted to stop the leaks in the Glens Falls feeder by which a considerable portion of the water discharged through that feeder for supplying the Champlain canal has heretofore been lost, it was necessary for several weeks during the past summer to use the whole available supply of water from Glens Falls, and I am of the opinion that the recommendation of the Superintendent of Public Works for the erection of one or more reservoirs on the upper Hudson, to be under the control of the State, should be carried out without delay.

On the western division, although the supply from Lake Erie is practically inexhaustible, the extent of canal fed from that source is so long as to make the assurance of a sufficient supply on the eastern portion of that division dependent on an unobstructed channel.

The difficulties which have been experienced in keeping this part of the canal fully supplied of late years result chiefly from the sedimentary deposits in the prism, the growth of aquatic plants and the existence of a pier at the draw-bridge at Albion, all of which contract the water-way and impede its flow.

I heartily concur in the recommendations of the Superintendent of Public Works for removing these obstructions. During the past summer considerable detention was occasioned on the Rome level of the Erie canal from the lack of water and the time required to make the reservoirs which feed this level available.

The construction of the dam and reservoir at the head of the Forestport pond, on the Black river, by which a large supply of water will be saved and the saving of thirty-six hours effected in the transmission of water to this level of the canal, for building which an insufficient appropriation has already been made, should, as recommended by the Superintendent of Public Works, be provided for at the earliest practicable moment.

4. THE CONDITION OF THE CANAL.

Though there is undeniably a gradual deterioration of the structures of the State canals, comparing the result of a careful inspection of their condition during the past year with the result of my examination of them ten years ago, as the expert engineer of the Canal Investigating Commission, I am of the opinion that they have suffered no change, materially impairing their efficiency during that period, and that no considerable extraordinary expenditure will be required to maintain their present efficiency for many years.

The general condition of the perishable structures has been fully maintained, if not improved.

The building and use of twelve additional scows by the Superintendent of Public Works during the past year for gravelling the tow path, has produced a very marked improvement and the methods he has adopted by the concentration of mechanical work in large shops has resulted in great economy in the maintenance of the mechanical structures.

5. IMPROVEMENTS IN PROGRESS.

Under special acts of the Legislature there are now in progress the following extraordinary improvements: 1. The lengthening of lock No. 50, near Syracuse, to double its former length for the purpose of permitting coupled boats to be locked without detention. 2. The construction of an iron bridge across the Erie canal at Medina. 3. The construction of an iron bridge across the Champlain canal at Watervliet. 4. Rebuilding of Burden's waste-weir on the Champlain canal at Waterford. 5. Building a spill-way between locks 5 and 6 on the Champlain canal. 6. Rebuilding the waste-weir above lock No. 11 on the Champlain canal. 7. Rebuilding a culvert three-quarters of a mile south of Fort Miller lock on the Champlain canal. 8. Rebuilding bridge at the foot of the Glens Falls' feeder on the Champlain canal. 9. Rebuilding Eastman's waste-weir on the Champlain canal near Whitehall. 10. Constructing seven bridge abutments on the lower section of section No. 1 on the Champlain canal. 11. Improvement at the sloop lock pier of the Troy dam. 12. Rebuilding culvert at Thorn's Lane on the Champlain canal. 13. Rebuilding waste-weir at lock 20 on the Champlain canal. 14. Minor improvements at over twenty different places on the Champlain for the purpose of rectifying its curvature, widening its prism and strengthening its banks. All these works of extraordinary repairs on the Champlain canal are being effected under chapter 301 of the Laws of 1884, re-appropriating certain funds for the improvement of this canal and they will suffice to put its mechanical structure in good condition and greatly increase the facility and security of its navigation.

6. THE WEST SHORE RAILWAY.

The West Shore Railway for more than eleven miles of its extent is built alongside the Erie Canal and encroaching upon the State land. Its construction upon this location was authorized by permits granted by the Superintendent of Public Works under stringent regulations as to its method of construction. The requirements of these permits have not in all cases been fully complied with as yet; the amount still remaining to be done is not of very great magnitudes and when fully completed will effect a permanent improvement of the portions of the canal along which the railroad runs, as under these permits the railroad company are required to permanently widen the canal and protect its banks with permanent structures.

7. THE ALBANY BASIN.

The Albany Basin was built and for many years used as the eastern terminus and harbor for the State canals. For many years, however, all through eastern freights have gone directly to destination at the seaboard without breaking bulk, so that the eastern terminus of the canal has been transferred from Albany to the port of New York. As a consequence the Albany basin has long been in disuse for canal purposes and ceased to be of interest to the State. So long, however, as it remains under the State's jurisdiction it should not be permitted to become a nuisance to the citizens of Albany where it is located, and the Legislature should provide the necessary means for keeping it cleaned out. As the report to you of the State Board of Health clearly shows, it is now in a very disgraceful sanitary condition.

8. ADIRONDACK LANDS.

At the request of the Commission appointed by the Comptroller to investigate and report a system of forest preservation, the State Engineer has caused a map of all the public lands in the Adirondack region to be compiled from the records in his office and the office of the Comptroller.

Such a map seemed to be necessary to enable those Commissioners to even begin their labors.

Though the State in the past twelve years has appropriated over \$100,000 for the ostensible purpose of securing accurate surveys and maps of this Adirondack wilderness, no map of any value upon which any reliance could be placed by these Commissioners was found to exist. As there were no other available funds for meeting the expenses of making the map compiled by me, it has been paid for from the fund appropriated for the purposes of the Forestry Commission.

The map is of permanent value to the Land and Tax Departments of the State and the cost of making it is not properly chargeable to that fund but should be provided for by special appropriation.

9. THE ENGINEERING DEPARTMENT.

In addition to the ordinary duties of the staff of the engineering department connected with the canals, they have had charge of the improvements at the Buffalo Asylum for the Insane, authorized by Chapter 488 of the Laws of 1884; they have made the surveys, levels and maps required by concurrent resolutions of the Assembly, relating to improvements of Flint Creek in Ontario and Yates coun-

ties, and to the establishment of benches, and the observation of the different stages of water in the Seneca river, a report of which is attached hereto, and have made all the surveys and maps, and given such expert testimony as was required in protecting the interests of the State before the Court of Claims.

A tabular statement of the expenditures of the department, and the personnel of the engineering staff, will be found in the report of the division engineers attached to this report.

In this connection, I may be permitted to reiterate the protest of some of my predecessors to certain encroachments on the province assigned to the office which I have the honor to hold, by establishing independent bureaus to conduct surveys for the State, and which seem to me to be prejudicial to its dignity, and prejudicial to a simple and efficient administration of the engineering branch of the public service of the State.

The laws defining the functions of the State Engineer and Surveyor, beside the supervision of the engineering matters pertaining to the public works, devolve on him the duty of superintending the survey and sale of the State lands, settling all disputed internal boundaries, and direct him to collect and preserve all maps, plans, drawings, levels and surveys of every description made or to be made for the use of the State.

The evident intent of founding this office was to create a department having complete jurisdiction over all engineering and surveying subjects in which the State was concerned. To divide this jurisdiction, and scatter these functions among independent commissions and bureaus, degrades the dignity of this constitutional office, and is inconsistent with responsible, efficient, harmonious and economical administration, besides scattering the engineering records of the State, of which this office is the legal depository.

Though the State survey and its prototype, the Adirondack survey, have been in operation nearly ten years, yet there is not an official record in this office relating to either, except the protest of my predecessors against their independent continuance.

Those who plead for a special treatment of this part of the State's work ignorantly magnify its difficulty, because it is one of the simplest fields entered by the civil engineer, and they underrate the popular intelligence, and forget the Civil Service Law, when they express fear that it will be mismanaged under an elective office.

The economy of having all the State's engineering operations con
[Assem. Doc. No. 38.]

ducted under one responsible head is obvious, aside from the consideration that all bureaus, organized to accomplish particular objects, have an incurable tendency to magnify and prolong their mission.

Though a great deal of ignorant and inconsiderate matter has been said and written in favor of this work, a careful survey that will furnish the basis for an accurate map of our State is of very great importance and should be prosecuted to completion.

We should not, however, allow ourselves to be deluded as to the full significance of the undertaking.

The trigonometrical survey by which the State is being covered with a series of connected triangles, forms only the basis or skeleton of the work, and is utterly useless to the map maker, and practically so to the local surveyor, or any one else until filled in with a network of linear surveys, serving to locate the more important political and artificial boundaries which subdivide, and the natural and artificial objects which characterize and diversify its surface.

This is a work of considerable magnitude, but no civilized State can afford to forego it, and under whatever management it be conducted, it should be more liberally supported, in order that it may be progressed in a far more energetic and business like manner than has thus far been done and to bring its cost within reasonable limits, and to make its results available to the next generation.

10. THE CANAL PROBLEM.

To all who have studied the comparative statistics of railway and canal commerce for the last few years it must be apparent that the canals are fast losing their prominence as a factor in the problem of transportation. That they still exercise and may be confidently expected for many years to continue to exercise a salutary influence in the regulation of freight tariffs there can be no doubt. But it is quite as evident that in their present condition they can never again play the prominent part in internal commerce that they did twenty years ago.

There are two methods of improving the Erie canal and in my opinion only two worthy of consideration.

The first is to increase its depth one or two feet by such deepening of the channel and raising of the banks as is consistent with maintaining the integrity of its present structures and to lengthen the locks to facilitate the use of steam by permitting boats to be

locked in pairs. This system of improvement would give the best attainable result for the boats now in use and to the consort system of steam towage for their movement.

The second method is to enlarge it to such an extent as to make it available for the steamers navigating the lakes a class, of vessels of large tonnage and moderate power and speed, which are rapidly displacing all other merchant marine for freight traffic on the lakes and on the ocean.

Any compromise scheme of improvement greater than the one first above mentioned and less than the last would necessitate a new and independent marine for the canal and the delay and expense of breaking and transferring cargo which is the fatal trouble with canal business now, and must in the nature of the case be a flat failure.

If the method of improvement first described had been adopted eight or ten years ago when first advocated by intelligent friends of the canal, it would probably have insured the general adoption of the steam consort system and sufficiently shortened the time and economized the cost of freight service by canal as to have greatly increased and prolonged its usefulness and importance.

But the march of time and events has brought about such economies in other means and routes of transportation that the minor improvement, I have suggested, is in my judgment already inadequate to meet the present and prospective wants of the northwestern commerce seeking the east and the sea and that the more radical and extensive improvement is needed.

To describe the radical improvement of the Erie canal which I have mentioned and which I believe to be of incalculable importance to the State and city of New York, I take the liberty of quoting from my paper on the subject read before the American Society of Civil Engineers in June last:

“It is clear to me that the Erie canal, to become the permanent highway of this commerce, must have sufficient capacity to float the largest vessels navigating the great lakes from Lake Erie to the deep waters of the Hudson, and in view of the fact that the draught of the lake vessels is now limited by the dimensions of St. Mary's and St. Clair canals, which may hereafter be enlarged, the locks of our canal should be large enough to provide for the probable increase in the size of lake vessels.

“The canal should be at least eighteen feet deep and 100 feet wide at bottom, and its locks should be 450 feet long and sixty feet wide. The successful operation of the canal thus enlarged requires that it should receive its water from the lake and discharge it into

the Hudson, on account of the insufficiency of water tributary to its route to supply it.

“ This and various topographical and economic considerations render a radical change in parts of the route and profile of the old canal essential.

“ These changes are entirely practicable and involve no very serious difficulties.

“ The essential change in profile consists in extending the Rome level westward to lock 57, between Newark and Lyons, in Wayne county, throwing out the locks 47 to 56, inclusive. This change in profile can be effected by swinging the route to the southward, near Newark, crossing the Canandaigua outlet and occupying ground of the proper elevation along the south side of Clyde river, and crossing the Seneca river at the narrowest part of its valley, which is near its junction with the outlet of Cayuga lake, from where it should gradually approach the present route of the canal, and connect with or cross it just east of the city of Syracuse.

“ The only serious difficulty encountered on this route is the crossing of the Seneca river, where the water surface of the canal must be nearly fifty feet above that of the river, and for nearly two miles over forty feet above the surface upon which its embankment must be built.

“ This change of route, to secure a continuously descending profile from the lake to the Hudson river, is the only deviation from the route of the old canal that is absolutely necessary ; but I think the construction would be simplified and cheapened, and the best possible water-way secured, by the adoption of an entirely new route from Syracuse eastward.

“ Lower ground can be obtained for the Rome level, except at the summit itself, by moving the line northward, thus, by lowering the elevation of this level throughout, lessening the difficulties of the Seneca river crossing, and from a point a little west of Utica eastward to the Hudson the Mohawk river should be canalized by the erection of locks and movable dams at suitable points in its course, and the deepening and rectification of its channel.

“ From the mouth of the Mohawk, at Troy, to the deep water of the Hudson river, below Coxsackie, that river must be improved by narrowing and deepening its channel, or a canal must be constructed along its shore. The former method of construction affords, in my judgment, the simplest and most useful means of securing the desired results.

“ The plan may, therefore, be summarized as the widening, deepening and necessary rectification of the worst curvatures of the present canal, from Buffalo to Newark, about 130 miles, the construction of a new canal from Newark to Utica, about 115 miles, the canalization of the Mohawk River from Utica to Troy, about 100 miles, and the improvement of the Hudson River from Troy to Four Mile Point, in Coxsackie, a distance of about thirty miles.

“ The elevation of the western level of the canal being governed by the surface of Lake Erie, must secure the required depth wholly by deepening, while the profiles of the levels from Lockport east can be adjusted to meet the economical requirements that will be disclosed by detailed surveys.

“ The first level from Buffalo to Lockport, will be thirty-two miles long. Descending from this level at Lockport, by two locks, each of about twenty-five feet lift, the second level of the canal will be reached. This level, sixty-four miles in length, will extend to Brighton, where, descending by two locks of about twenty-four feet lift, we reach the third level of the canal, extending from Brighton to Macedon, twenty miles, there descending by a lock of about twenty feet lift, we reach the fourth level, extending from Macedon to Newark, twelve miles ; where, by a lock of about twenty feet lift is reached the level of the proposed new canal, to extend from Newark to Utica, about 115 miles, which will be the fifth and longest level of the new canal. From that point the Mohawk River (except at Little Falls and Cohoes, where combined locks will be required) can best be canalized through locks of ten or twelve feet lift, making pools having an average length of about five miles each.

“ The construction of this great artificial river, more than 300 miles long, involving as it does so vast a structure, which must be built in a manner to attain absolute security and permanence ; the aquisition of large areas of land ; the maintenance of the drainage of the country it traverses, and the erection of swing bridges at all necessary crossings, is a vast enterprise, both in engineering and in finance. It is a problem, however, that cannot be accurately stated even, either in a financial or in an engineering sense, until detailed surveys furnish data for detailed plans and estimates, and until a careful compilation of industrial statistics furnishes the means of judging the volume of tonnage it will probably command.

“ The first requisite to the possible inauguration of this enterprise is, of course, a careful system of surveys that will determine its probable cost, and whether it be undertaken by private enterprise,

as most of the great artificial transportation lines of the world have been, by the aid of the National Government, or by the State itself, every consideration of State interest and State pride requires that it, should remain forever under the sovereign control of the Empire State."

"Deeply impressed as I am, with the importance of this subject I respectfully commend to the Legislature the propriety of authorizing and providing for the necessary surveys and estimates to be made for determining the elements of this problem.

"Let us consider the effects of this improvement. For the past four years the average grain rates from Chicago to New York during the season of navigation have been by rail $14\frac{2}{10}$ cents, by lake to Buffalo and thence by rail to New York, $12\frac{1}{10}$ cents, and by lake and canal to New York, $9\frac{2}{10}$ cents per bushel.

The large propellers of the lakes have, however, during this period, found a profit in carrying grain from Chicago to Buffalo at two cents a bushel, while the cost by canal from Buffalo to New York, though the distance is only half as great, without tolls, but including the cost of transfer has, at the same time, been more than four cents per bushel, more than twice the cost, and more than twice the time in transit for one-half the distance.

In the enlarged canal, making due allowance for reduced speed in the narrow channel and for lock detentions, the propeller would make the trip from Buffalo to New York in as short a time as she requires between Chicago and Buffalo, and thus deliver her cargo from Chicago to New York in less time and at less cost than can now be done by canal from Buffalo to New York. Such a realization would establish the commerce of New York on an enduring basis, never to be shaken by any development of trade, or combination of circumstances, that now seem possible.

All the great railway systems of the west, north of Arkansas and Texas, terminate at lake ports, and their prosperity and very existence depend on the diversion of all the business they can control to these ports, and with this canal enlarged, all the heavy freights that reach those ports, bound east, are destined by the laws of trade to take the water route, as being cheaper than any rail transit yet dreamed of. Within the net-work of these railway lines, or grouped about the great lakes themselves, lay the great grain fields of the country, its principal forests and mines, as well as the chief part of its inland cities.

They must all become tributary to this canal if enlarged, and offer in commodities suited to canal transportation a larger volume of tonnage than the world has ever seen concentrated on an artificial line of transportation.

The importance of this enterprise increases with the rapid growth of our population, and the consequent changing social and economic conditions of the country. Our productive capacity is beginning to exceed the demand. Our foreign grain markets are threatened with new competition from India and Australia.

If our national prosperity is to continue, we must reach foreign markets with our manufactures, and thus, by increasing the manufacturing class, create new home demands for our surplus food.

To reach these markets, we must cheapen the goods by lessening the cost of living to the operatives, and also the cost of bringing together the raw materials requisite to manufacturing processes, and of sending the manufactured products to market.

With our wide-spread territory, cheap transportation is the chief agency in effecting these economies, and the Erie canal, joining the granaries, the mines and the forests of the west, with the manufactories of the east, should be endowed with the necessary capacity to effectually realize the ideal of the political economist as to transportation."

Respectfully submitted,

E. SWEET.

SUMMARY of engineering expenses for the canals during the fiscal year ending September 30th, 1884.

EASTERN DIVISION.

For ordinary repairs, Erie canal.....	\$5,121 71	
For ordinary repairs, Champlain canal....	983 04	
For incidental expenses.....	703 68	
	<hr/>	
Total		\$6,808 43

MIDDLE DIVISION.

For ordinary repairs, Erie canal..... ..	\$4,183 71	
For ordinary repairs, Oswego canal.....	1,011 47	
For ordinary repairs, Cayuga and Seneca canal.....	1,155 26	
For ordinary repairs, Black river canal...	400 08	
	<hr/>	
Total.....		6,750 52

WESTERN DIVISION.

For ordinary repairs, Erie canal.....	\$5,806 70	
For incidental.....	546 75	
	<hr/>	
Total		6,353 45

Total engineering expenses for ordinary repairs.....	\$19,912 40
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EASTERN DIVISION.

Expended for extraordinary repairs, under chapter 301, Laws of 1884, reappropriating \$201,283.66 for improving the Champlain canal.....	7,555 67
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MIDDLE DIVISION.

Expended for extraordinary repairs.....	160 20
	<hr/>
Total engineering expenditures.....	<u>\$27,628 27</u>

IN MEMORIAM.

At a meeting of the State Officers and Staff of the Engineering Department held at the office of the State Engineer in Albany, December 4, 1884, as a tribute of respect to the memory of Charles Hilton, late Deputy State Engineer and Surveyor, the following memorial was unanimously adopted :

The attaches of the State Departments have heard with deep regret of the death of their late associate, Charles Hilton, Deputy State Engineer and Surveyor. Actuated by a high appreciation of the nobility of his character, they affectionately place this memorial upon record :

Mr. Hilton early in life embraced the profession of civil engineering for his life work, and by assiduous industry, assisted by natural abilities of a high order, early attained distinction in it and has left in the great number of important engineering works designed and executed by him, lasting monuments of his professional skill and ability. He was a man of firm convictions and of unimpeachable integrity, whose official life was marked by a high sense of the responsibilities, and a faithful and conscientious discharge of the duties imposed upon him. Free from prejudice, he was to all men a gentleman, while his intercourse with his associates in the State's service was distinguished by a suavity of manner and a pleasantness of speech which endeared him to them with more than ordinary affection. Indeed, so warm and generous were the impulses of his heart that to know Mr. Hilton was to be admitted to a share in his friendship. Expressing our heartfelt sorrow at the death of so good a man and impressed with a profound sympathy for his afflicted family, it is

Resolved, That as a public mark of our regard for his memory, we attend his funeral in a body, and that these proceedings be published in the city papers.

J. P. MASTERSON,
Secretary.

E. SWEET,
Chairman.

EASTERN DIVISION.

ANNUAL REPORT OF THE DIVISION ENGINEER, NEW YORK STATE CANALS, 1884.

ALBANY, N. Y., *October 1, 1884.*

Hon. E. SWEET, *State Engineer and Surveyor :*

SIR — I have the honor to transmit herewith my annual report for the fiscal year ending September 30, 1884.

Yours respectfully,

JOHN R. KALEY,

Division Engineer.

DESCRIPTION OF THE EASTERN DIVISION.

The limits of this division remain as fixed by the Canal Board, in February, 1876.

It embraces the Erie canal from Albany to the east line of Oneida county, and the whole of the Champlain canal, including their basins, side cuts, river improvements and feeders.

The canal is entered from the river at its terminus through Lock No. 1, also by two side cuts, one at Port Schuyler, and the other at West Troy, the connection at Albany and West Troy being with double locks, and at Port Schuyler by single lock.

This division also embraces the Champlain canal from its junction with the Erie at West Troy to Whitehall together with the Glens Falls feeder, from where it joins the Champlain, one mile north of Fort Edward to the feeder-dam in the Hudson river, two miles west of Glens Falls, including also the pond extending five miles above this point together with the pond above the Troy dam and the Waterford side cut.

The Champlain canal is entered from the Erie at West Troy and from the pond in the Hudson at Waterford through the side cut.

The number of miles of navigable canals and river improvements on the Eastern Division is as follows:

	Miles.
Erie canal, Albany to Utica.....	106.243
Port Schuyler side cut.....	.35
Albany basin.....	.77
Champlain canal, including Waterford side cut and Cohoes and Saratoga dams	66.00
Pond above Troy dam.....	3.00
Glens Falls feeder and pond.....	12.00
Total.....	<hr/> 188.363 <hr/>

Extent of feeders not navigable.

	Miles.
Mohawk river at Rexford Flats.....	.39
Mohawk river south side, Little Falls.....	.19
Mohawk river at Rocky Rift.....	3.92
Schoharie creek.....	.63
Total.....	<u>5.13</u>

Erie Canal — Water Supply.

The Erie canal upon this division is supplied with water from the following sources :

That portion of this division west of Little Falls is supplied from reservoirs and streams on the Middle Division, through the Rome level. At Little Falls the supply is through the feeder from the Mohawk river, entering the canal through the tow-path, about sixty feet below Lock No. 39.

Near Mindenville, the supply is through Rocky Rift feeder from the Mohawk river, discharging into the canal through the tow path, four hundred feet below Lock No. 34.

Near Fort Hunter, the supply is from Schoharie creek, discharging into the canal on the berme side, about four hundred feet below Lock No. 29.

At Rexford Flats, the supply is from the Mohawk river, entering the canal through the tow-path, about one hundred and twenty feet below Lock No. 21.

Notwithstanding the large amount of waste at Little Falls and at Schoharie creek, in consequence of the dilapidated condition of the feeder-dams at those points, the water supply on this division of the Erie canal has been uniformly good, and the levels generally kept fully up to their proper elevation.

Champlain Canal — Water Supply.

The water supply of the Champlain canal is principally from the Hudson river through the Glens Falls feeder, discharging into the summit level of the Champlain canal, supplying the canal from Fort Ann to Whitehall, being supplemented on the north by waters of Wood creek. Also from Northumberland to the first lock north of Waterford, the supply is from the Hudson river entering the canal at Northumberland, and from the last-mentioned lock to the Erie canal, including the Waterford side cut, the supply is from the Mohawk river.

The water supply on this canal during the past fiscal year has been equal to the demand.

Wide waters may be secured both on the Erie and Champlain canals, making reservoirs of considerable size and at comparatively small expense, except the items of land damages, by removing the berme bank and allowing the water to flow back to the foot of the

hills thus enlarging the prism and securing wide water at many points.

On the Champlain canal by cutting off bends in the tow-path the alignment may be very much improved, the prism enlarged and the water supply increased. Many improvements of this description have been made during the years of 1883 and 1884, which will be described more fully in this report:

Erie Canal — Dams.

No. 1. Located at Rexford Flats, Schenectady county, across the Mohawk river known as the upper Aqueduct dam. This dam is of cut stone on a rock foundation, has a crib apron of timber and stone; the length of the dam proper is 675 feet and it is seven feet high. There is a fishway in this dam and each year it becomes necessary to repair damages to the same caused by spring freshets. The dam proper is in good condition, the feeder bulkhead at the arch passing under the canal should be rebuilt. The fishway has been repaired.

The head of the feeder is situated several hundred feet up stream from the upper Mohawk Aqueduct and passes through a large culvert under the canal between the aqueduct and Lock 22, discharging into the level below Lock No. 21.

No. 2. Located near Fort Hunter, Montgomery County, across Schoharie Creek, known as the Schoharie Creek Feeder Dam; is constructed of timber cribs filled with stone and covered with timber. The length of the dam proper is 575 feet, with cut stone abutments.

The crib work and covering are much worn and should be repaired.

No. 3. Located about five miles east of Little Falls at Castle Creek, Herkimer County, over the Mohawk river and known as Rocky Rift Feeder Dam.

The dam and abutments are of cut stone on a rock foundation. The length of the dam proper is 600 feet. The crest of the dam is too low and should to be raised about two feet. I would recommend raising the dam and abutments; raising a dam by means of a two foot course of masonry laid upon and bolted to the present coping. In seasons of low water it becomes necessary to use about two feet of flash boards to secure the necessary elevation of water.

No. 4. Located at Little Falls, Herkimer County, across the Mohawk river is composed of logs, brush, and gravel, has abutments and bulkhead of cut stone with two lock gates. The dam proper is about 770 feet long; 490 feet north and 280 feet south of a small island situated at the head and dividing the same.

I would recommend that a new dam of stone be built somewhat below the present structure, where the length would not exceed 500

feet, and to use in the construction of the same the stone from the abandoned aqueduct at Little Falls, thereby materially reducing the cost.

Erie Canal — Locks.

There are forty-seven double locks on this division of the Erie canal, two of which are on the West Troy side cut, also two single locks combined on the Port Schuyler side cut, the two last mentioned connecting the canal with the Hudson river at these points; there are also two weigh locks, located at West Troy and Albany.

All are enlarged, being 110 by 18 feet each in the chamber with various lifts, as shown by the accompanying table. The forty-five locks situated on the main canal from Albany to the east line of Oneida County have a total lift of 425.4 feet above tide water. Locks 37 and 44 have tumble gates at upper end; Lock No. 39 has a tumble gate in berme lock; the rest all have mitre gates. Those of Lock No. 37 are all operated by water power machinery also the tumble gates in Locks Nos. 39 and 44.

The locks on this division are for the greater part in good condition and need very little repairs. The most important recommendation I have to make is, that where needed they should be thoroughly pointed with Portland cement; the joints being well cleaned and the cement well caulked in the joint. I would also recommend that, as a matter of economy to the State, the face stone of all new lock masonry be laid in a mortar of Portland cement; this has been tested on canal work and with success.

The ring stone of the arch at Lock 24 should be replaced.

The upper berme Lock No. 43, at Mohawk, should have the bottom under the apron and the well at the lower end of the lock concreted and replanked, the same having been washed out and temporarily repaired during the year.

There has been more or less work performed on the locks in the way of general repairs to the foundations, gates and paddles, pointing masonry, etc., which cannot be given in detail.

NUMBER.	DISTANCES.		Lift in feet
	Lock to Lock.	From Albany.	
1.....	.....	.....	15.159
2.....	98 chains 83 links	1.24 miles	9.495
3.....	419 chains 16 links	6.48 miles	11.169
4.....	25 chains 17 links	6.80 miles	11.380
5.....	21 chains 90 links	7.07 miles	10.597
6.....	16 chains 52 links	7.28 miles	10.073
7.....	10 chains 61 links	7.41 miles	9.931
8.....	12 chains 86 links	7.57 miles	10.545
.....	26 chains 53 links	7.90 miles	9.408

TABLE—(Continued).

NUMBER.	DISTANCES.		Lift in feet.
	Lock to Lock.	From Albany.	
10.....	14 chains 58 links	8.08 miles	10.362
11.....	12 chains 91 links	8.24 miles	9.621
12.....	11 chains 66 links	8.39 miles	9.986
13.....	16 chains 5 links	8.59 miles	10.345
14.....	17 chains 9 links	8.80 miles	10.032
15.....	21 chains 53 links	9.07 miles	9.833
16.....	15 chains 20 links	9.26 miles	10.045
17.....	25 chains 39 links	9.58 miles	10.287
18.....	15 chains 44 links	9.77 miles	10.249
19.....	708 chains 42 links	18.63 miles	8.441
20.....	219 chains 29 links	21.37 miles	10.418
21.....	257 chains 90 links	24.59 miles	11.126
22.....	14 chains 1 link	24.77 miles	11.609
23.....	553 chains 43 links	31.69 miles	8.318
24.....	63 chains 7 links	32.47 miles	7.326
25.....	303 chains 87 links	36.27 miles	8.581
26.....	510 chains 59 links	42.66 miles	8.365
27.....	16 chains 8 links	42.86 miles	7.886
28.....	417 chains 16 links	48.07 miles	7.723
29.....	157 chains 20 links	50.04 miles	7.399
30.....	50 chains 60 links	50.67 miles	10.213
31.....	1108 chains 34 links	64.52 miles	5.867
32.....	505 chains 62 links	70.84 miles	8.126
33.....	408 chains 77 links	75.95 miles	5.704
34.....	205 chains 63 links	78.52 miles	8.483
35.....	254 chains 23 links	81.70 miles	7.785
36.....	349 chains 20 links	86.07 miles	10.019
37.....	49 chains 52 links	86.68 miles	9.898
38.....	12 chains 87 links	86.85 miles	8.733
39.....	17 chains 35 links	87.06 miles	10.524
40.....	220 chains 82 links	89.82 miles	8.524
41.....	211 chains 11 links	92.46 miles	8.286
42.....	228 chains 99 links	95.32 miles	7.954
43.....	20 chains 59 links	95.58 miles	8.069
44.....	216 chains 16 links	98.28 miles	10.737
45.....	98 chains 62 links	99.52 miles	11.172
45 to county line....	537 chains 67 links	106.24 miles	.....

ERIE CANAL — AQUEDUCTS.

There are sixteen aqueducts on this division of the Erie canal, the abutments and piers of which are all dressed masonry.

No. 1, known as the lower Mohawk aqueduct, is located at Crescent, three and a half miles north of Cohoes, where the canal crosses the Mohawk river ; it is 1,137 feet long, has twenty-six arches supported

by two abutments, and twenty-five stone piers; this is the largest aqueduct on the canals. The masonry is in good condition. Slight repairs should be made to the timber work.

No. 2 is known as the upper Mohawk aqueduct, located at Rexford Flats, four miles east of Schenectady, crossing the Mohawk river at that point. It is 610 feet long and has thirteen arches. The masonry in this structure is in good condition. The ice breakers should be protected by timber and plank. Some of the timber work is decayed and needs to be renewed, especially in the foot bridge.

No. 3 is over Flat Stone creek, five and three-quarter miles west of Schenectady, and known as Van Slykes' aqueduct, is seventy-two feet long with three arches. The creek channel above and below the structures should be cleared.

No. 4, over Sansai Kill at Pattersonville, Schenectady county, is known as Hoffman's aqueduct, and is 102 feet long and has four arches. Some of the masonry at the ends of the piers and abutments on the berme side which has been displaced during the spring freshets by ice, should be replaced, and portions of the wings need repointing. The creek channel above and below the aqueduct and under the trunk is very badly filled up and has to be cleaned out every year.

No. 5, known as the Schoharie creek aqueduct is located at Fort Hunter, Montgomery county, and crosses Schoharie creek. This structure is 624 feet long and has fourteen arches. Two of the piers need rip rap or crib work around them to prevent scouring and settling. The trunk has been repaired.

No. 6, over Tokkon creek, three and a half miles west of Fultonville, Montgomery county, is known as Van Wies aqueduct. It is 101 feet long, is constructed with abutments and piers, has no arches, but four openings; is in good condition. The trunk has been renewed and masonry repaired and pointed.

No. 7, over Leonardsson creek at Yatesville, Montgomery county, known as the Yatesville aqueduct. It is 101 feet long and is the same kind of structure as No. 6. This structure is in good condition. The masonry has been repaired and pointed. The creek channel should be cleaned.

No. 8, over Leonardsson creek at Little Nose, known as Lasher's aqueduct. It is seventy-four feet long, is constructed of abutments and piers without arches and only three spans. The masonry has been repaired and repointed to the water level, and new caps put on. The creek channel needs clearing.

No. 9 is over Platt Kill at Spraker's basin, Montgomery county, known as Spraker's aqueduct. It is 128 feet long and has five arches. Masonry and trunk in good condition. The creek is filled almost up to the bottom of the trunk and needs a large amount of work every year to keep a sufficient opening under it to allow a passage for the water. The entire trunk of this structure has to be removed during the close of navigation each year, to save it from being floated and destroyed.

No. 10 is over Bowman's creek at Canajoharie, Montgomery county, and is known as Canajoharie aqueduct. This structure was built in every way like the last described, having five arches, but owing to the violent character of the stream during the spring freshets sev-

eral years since, three of the piers were so much injured, that it was thought best to remove the upper portion. Since that time wooden bents have been used for sustaining the trunk during the season of navigation, which have to be removed at the close of each year. The masonry and trunk are in good condition. More or less work has to be done here every season to keep the channel open.

No. 11, over Otsquago creek at Fort Plain, Montgomery county, and known as the Fort Plain aqueduct. It is 126 feet long and has five arches with the masonry and trunk in good condition. The trunk of this aqueduct also has to be removed during the close of navigation. The channel of the creek should be cleared.

No. 12, over Castle creek in Herkimer county, five miles east of Little Falls, known as Castle creek aqueduct, is 128 feet long and has five arches. The masonry and trunk need only slight repairs. The channel of the stream below the aqueduct ought to be cleared and grubbed, then graded to turn the water into the centre of the stream. Some years since spring freshets washed the channel on one side deeper than the other, and the stream has since been confined there, leaving the other side overgrown with trees, which are now of considerable size. The stream, while confined to this side of the channel, is injuring the covering of the feeder culvert a short distance below where the feeder passes under the stream, and should therefore be turned to the centre of the channel. The docking in the creek is in bad condition, and instead of removing the same, I would recommend that the stone removed from the channel be used to rip rap the bank or pave the same.

No. 13, over Fulmer's creek at Mohawk, Herkimer county, is known as the Mohawk aqueduct. This structure is seventy-four feet long with three arches. The upper portion of the west pier on the berme side has masonry displaced which should be relaid, and the joints of the masonry should be pointed. The channel should be cleared.

No. 14, over Steel's creek at Ilion, Herkimer county, known as the Ilion aqueduct, is only fifty feet long and has two arches. Some of the masonry on the upper portion of the pier on the berme side is displaced and should be relaid, and the entire coping of the parapet wall on the outside of tow-path has been removed. The berme wings have large leaks which will probably require much more work than to point them only; possibly some portion of the masonry in one wing will have to be taken up. All the masonry needs thorough pointing and the channel of the stream should be cleared.

No. 15, over Myer's creek at Frankfort, Herkimer county, known as the Frankfort aqueduct. This aqueduct is a duplicate of No. 14, and is in about the same condition. The masonry needs some attention, replacing small portions and a large amount of pointing. One side of the trunk should be new and the channel of the creek should be cleared.

No. 16, over Ferguson's creek in Herkimer county, three miles east of Utica, and known as Ferguson's aqueduct, is twenty-two feet long and but one arch. The masonry is in good condition, but needs repointing.

AQUEDUCTS — Erie Canal.

Number.	NAME.	Location, Distance west of lock		Interior width.	Number of spans.	Total length.
1	Lower Mohawk.....	220 chains	53 links west of lock	40 ft 6 in	....	17 chains 23 links
2	Upper Mohawk.....	6	" "	44 ft 4 in	....	" 25 "
3	Flat Stone Creek.....	113	" "	.....	3	" 13 "
4	Sansai Kill.....	171	" "	52 ft	4	" 55 "
5	Schoharie Creek.....	8	" "	40½ ft	14	" 46 "
6	Tokkon Creek.....	664	" "	51½ ft	4	" 53 "
7	Leonardson Creek.....	846	" "	51 ft	4	" 53 "
8	Leonardson Creek.....	934	" "	50 ft	3	" 13 "
9	Platt Kill.....	5	" "	50 ft	5	" 94 "
10	Bowman's Creek.....	251	" "	.....	5	" 94 "
11	Otsquago Creek.....	18	" "	.....	5	" 91 "
12	Castle Creek.....	7	" "	50½ ft	5	" 94 "
13	Fulmer's Creek.....	2	" "	65½ ft	3	" 12 "
14	Ilion Aqueduct.....	129	" "	51½ ft	2	" 74 "
15	Myers' Creek.....	2	" "	66 ft	2	" 74 "
16	Ferguson's Creek.....	452	" "	57½ ft	1	" 33 "

ERIE CANAL — WASTE WEIRS AND SPILLWAYS.

No. 1. Spillway and waste-weir at West Troy on berme side of canal at upper end of the arsenal grounds, cut stone structure with bulkhead and gates, 33 foot spillway, less ten posts of one foot each and in fair condition.

No. 2. Spillway and waste-weir at West Troy, out of the Mohawk bason into the Hudson river, cut stone with bulkhead and gates in fair condition.

No. 3. Spillway and waste-weir a short distance below lock No. 4, in tow-path, cut stone with breast wall of masonry; spillway fifteen feet, is in fair condition. Masonry should be pointed.

No. 4. Spillway and waste-weir six and one-half chains west of lock No. 9 in tow-path, cut stone with breast wall; spillway fourteen feet six inches. Masonry in lower wing displaced and needs pointing.

No. 5. Spillway and waste-weir, a short distance above lock No. 18 in tow-path, cut stone with timber bulk-head, has twelve wickets; spillway, twenty-eight and one-half feet. This structure needs a new bulkhead and gates; as it now is, cannot be used.

No. 6. Spillway and waste-weir about 400 feet above lock No. 20 in tow-path, is of cut stone, arch eight foot chord and seventeen feet spillway. The masonry is in very bad condition and should be rebuilt from foundation.

No. 7. Waste-weir and spillway, just west of Frog alley bridge at Schenectady in tow-path. This is an old cut stone structure with spillway about 120 feet long which has been abandoned, but the bulkhead portion is still in use with spillway of twelve feet. This structure should be rebuilt with a much shorter spillway, say of thirty feet.

No. 8, waste-weir and spillway, about a quarter of a mile east of Port Jackson in tow-path. This is a nearly new structure of wood and stone; bulkhead should be rebuilt, spillway twelve feet, in good condition.

No. 9. Waste-weir with bulkhead in the tow-path about 500 feet east of lock No. 31, is a wooden structure and considerably decayed. Most of the timbers and plank will need to be new, also bulkhead and gates.

No. 10. Waste-weir with bulkhead in the tow-path, about 100 feet west of lock No. 33.

No. 11. Wooden waste-weir, twenty-eight feet spillway on tow-path about one-fourth mile west of lock 33, built in 1883.

No. 12. Waste-weir and spillway, with culvert of four foot chord of cut stone, spillway thirteen and one-half feet, at Fink's basin, two miles east of Little Falls in tow-path; the wings at ends need some repairing by taking down a portion of the masonry and relaying, besides some general repairs.

No. 13 is located two and one-half chains west of lock 36; spillway eleven and one-half feet, two valves five and one-half by two and one-half.

No. 14. Waste-weir and spill-way, about a quarter of a mile west of Little Falls, in the tow-path. This is an old structure of cut stone arch, twelve feet chord with sixty feet spillway. Masonry is considerably displaced; that portion back of the tow-path should be rebuilt.

No. 15. Waste-weir and spillway just above lock No. 40, in tow-

path, cut stone arch, twelve foot chord, spillway twelve feet. Back portion of this structure needs repairing, also needs new bulkhead.

No. 16. Spillway of seventy-five feet located ten and one-half chains west of Lock No. 41 ; has four valves $2\frac{1}{2}$ ft. by 2 ft. 2 in.

No. 17 is eighteen chains west of lock 42. Filled up and not used.

No. 18. Waste weir and spillway is about 500 feet west of lock No. 44 on berme side, cut stone ; about seventy feet of spillway has been raised with two courses of timber, and should be raised with stone. A new bulkhead is needed and some other general repairs of masonry.

The receivers, one above lock No. 20, one below lock No. 23, one east of Ilion and one west of lock No. 45, all on the berme side of the canal are in good condition.

The foundation and masonry of the two lower over-falls at Meyer's creek, Frankfort, have settled and need repairs.

WASTE-WEIRS — Erie canal.

Number	LOCATION, DISTANCE WEST OF LOCK.	Number of valves	Size of valves.	Length of spillway.	Height of crest + C. B.
1	308 chains, 30 links west lock 2.....	4	2½ ft.x3 ft.....	38 feet less 10 posts, 1 foot each.....	6.83
2	At West Troy.....	..	.....	.....	7.58
3	19¼ chains west lock 3	10	2 ft.x2½ ft.....	15 ft.....	7.59
4	7¼ chains west lock 9.....	5	2 ft. 1 in.x2 ft. 8 in..	14 ft. 6 in..	6.36
5	18 chains, 40 links west lock 18.....	8	.....	28 ft. 6 in..	5.91
6	12 chains, 20 links west lock 20.....	4	2 ft.x2½ ft.....	17 ft.....	6.80
7	368 chains, 46 links west lock 22.....	4	2 ft.x2½ ft.....	12 ft.....	7.41
8	163 chains, 84 links west lock 27.....	3	4 ft. 3 in.x2 ft. 10 in.	12 ft.....	7.48
9	1,097 chains, 9 links west lock 30	4	3 ft.x2½ ft.....	12 ft.....	Bot. of opening, 4.5 + C. B.
10	3 chains, 56 links west lock 33.....	2	5 ft.x2½ ft.....	10 ft.....	
11	One-fourth mile west lock 33.....	..	.....	28 ft.....	Bot. of opening, 4.92 + C. B.
12	286 chains, 2 links west lock 35.....	5	2 ft.x2½ ft.....	13 ft. 6 in..	
13	2 chains, 50 links west lock 36.....	2	5½ ft.x2½ ft.....	11 ft. 6 in..	6.73
14	16 chains, 52 links west lock 39.....	4	.....	60 ft.....	
15	13 chains, 2 links west lock 40.....	..	.....	12 ft.....	7.42
16	10 chains, 64 links west lock 41.....	4	2½ ft.x2 ft. 2 in.....	75 ft.....	
17	18 chains, 32 links west lock 42.....	..	.....	.....	Filled up; not in use.
18	About 8 chains west lock 44.....	..	.....	70 ft.....	

ERIE CANAL.

Culverts.

There are one hundred and twenty-seven culverts on this division of the Erie canal, ninety-nine of which are for the canal proper, three for Rocky Rift-feeder and twenty-five under various bridge approaches. Eighty-seven of those under the canal are located as shown in the table below.

TABLE.

Culverts, Eastern Division Erie Canal.

- Number 1, 31 chains west of lock 1, stone diving culvert, 3 openings.
- Number 2, 60 chains, 75 links west of lock 1, stone arch culvert, 4 feet chord.
- Number 3, 39 chains, west of lock 2, stone arch culvert.
- Number 4, 97 chains, 28 links west of lock 2, stone arch culvert.
- Number 5, 138 1-2 chains, west of lock 2, stone arch culvert.
- Number 6, 167 chains west of lock 2, stone arch culvert.
- Number 7, 189 chains, 40 links west of lock 2, stone double arch culvert, 7 feet chord.
- Number 8, 276 chains, 45 links west of lock 2, stone double arch culvert.
- Number 9, 313 chains, 25 links west of lock 2, stone double arch culvert, about 8 feet chord.
- Number 10, under Ferry street bridge approach, arch culvert, 12 feet chord.
- Number 11, 398 chains, 30 links west of lock 2, stone diving culvert.
- Number 12, 16 chains west of lock 3, stone diving culvert.
- Number 13, between locks 6 and 7, semi-circle arch, 12 feet chord, 7 feet bench wall.
- Number 14, 9 1-2 chains, west of lock 9, semi-circle arch, 8 feet chord, 2 feet 3 inch bench wall.
- Number 15, 9 chains, west of lock 13, semi-circle arch, 7 1-2 feet chord, 2 feet bench wall.
- Number 16, 1 chain, west of lock 17, stone arch culvert, 4 feet chord.
- Number 17, 28 chains, 65 links west of lock 18, semi-circle arch, 8 feet chord, 3 feet bench wall.
- Number 18, 187 1-2 chains, west of lock 18, stone diving culvert.
- Number 19, 250 chains, 54 links west of lock 18, semi-circle arch, 8 feet chord, 5 1-2 feet bench wall.
- Number 20, 483 chains, 55 links west of lock 18, stone arch culvert, 6 feet chord.
- Number 21, 515 chains, 54 links west of lock 18, box wooden trunk diving, 3 openings 3' x 2' each.
- Number 22, 651 chains, 95 links west of lock 18, stone box diving, 3 feet wide, 2 feet high.
- Number 23, 65 chains, 90 links west of lock 19, stone semi-circle arch, 9 feet chord, 5 1-2 feet bench.
- Number 24, 157 chains, 12 links west of lock 20, stone diving.
- Number 25, 5 chains, 60 links west of lock 22, stone arch, 13 feet chord.
- Number 26, 203 chains, 86 links west of lock 22, stone arch, 7 1-2 feet chord, 2 feet rise, 4 feet bench wall.

- Number 27, 277 chains, west of lock 22, stone arch diving, 13 feet chord, 2 1-2 feet rise.
- Number 28, 299 chains, 70 links west of lock 22, stone culvert, 6 feet chord.
- Number 29, 349 chains, 95 links west of lock 22, stone arch, about 8 feet chord.
- Number 30, 412 chains, 25 links west of lock 22, stone arch, about 7 feet chord.
- Number 31, 464 chains, 50 links west of lock 22, stone semi-circle arch, 12 feet chord, 2 1-2 feet bench wall.
- Number 32, 12 chains west of lock 24, stone arch, 7 feet chord.
- Number 33, 149 chains, 40 links west of lock 24, stone arch, 7 feet chord, 2 1-2 feet bench wall.
- Number 34, 174 chains, 12 links west of lock 24, stone semi-circle arch, 11 feet chord.
- Number 35, 154 chains, 60 links west of lock 25, stone box, 2 1-2 feet wide, 2 feet 10 inches high.
- Number 36, 218 chains, 8 links west of lock 25, stone semi-circle arch drop, 4 feet chord 1 foot 6 inches bench walls.
- Number 37, 269 chains, 90 links west of lock 25, wooden box culvert, 2 feet 4 inches by 1 foot 4 inches.
- Number 38, 360 chains, 70 links west of lock 25, stone semi-circle arch, 4 feet chord.
- Number 39, 401 chains, 20 links west of lock 25, stone arch drop, 10 feet chord, 2 1-2 feet rise.
- Number 40, 3 chains, 13 links west of lock 27, stone drop double, 18 feet chord, 3 feet rise, 2 1-2 feet bench wall.
- Number 41, 61 chains, 45 links west of lock 27, stone arch, 7 feet chord, 4 1-2 feet bench walls.
- Number 42, 96 chains, 40 links west of lock 27, stone arch drop double, 4 feet chord, 2 feet bench walls.
- Number 43, 163 chains, 84 links west of lock 27, stone arch drop culvert, 6 feet chord, 2 1-2 feet bench walls.
- Number 44, 207 chains west of lock 27, stone culvert.
- Number 45, 255 chains, 17 links west of lock 27, stone arch, four arches, 22 feet chord, 4 feet rise, 3 feet bench walls.
- Number 46, 5 chains, 24 links west of lock 28, stone arch drop, 6 feet 2 inches chord, 3 feet 2 inches high.
- Number 47, 85 chains, 20 links west of lock 28, stone arch culvert, 4 feet chord, 1 foot bench walls.
- Number 48, 140 chains west of lock 28, small stone diving culvert.
- Number 49, 71 chains, 50 links west of lock 30, stone arch culvert, 4 feet chord, 2 feet high.
- Number 50, 146 chains, 20 links west of lock 30, stone double arch, 10 feet chord, 3 1-2 feet rise, 2 feet bench wall.
- Number 51, 170 chains, 50 links west of lock 30, stone arch (4 arches), 22 1-3 feet span, 4 feet rise, 4 1-2 feet bench wall.
- Number 52, 282 chains, 50 links west of lock 30, stone box diving, 3 feet wide.
- Number 53, 336 chains west of lock 30, stone arch drop, 4 feet chord.
- Number 54, 400 chains, 25 links west of lock 30, stone arch drop double, 2 feet chord, about.

- Number 55, 427 chains, 10 links west of lock 30, stone arch drop, 4 feet chord, about 2 feet rise.
- Number 56, 707 chains, 40 links west of lock 30, stone semi-circle arch, 4 feet chord, 1 1-2 feet bench wall.
- Number 57, 807, chains, 60 links west of lock 30, stone semi-circle drop, 4 feet chord 1 1-2 feet bench wall.
- Number 58, 1,096 chains, 55 links west of lock 30, stone box drop, 5 feet wide.
- Number 59, 32 chains, 65 links west of lock 31, stone arch drop, about 8 feet chord, 2 feet rise.
- Number 60, 224 chains, 80 links west of lock 31, stone semi-circle arch, 4 feet chord.
- Number 61, 294 chains, 36 links west of lock 31, stone drop.
- Number 62, 377 chains, 70 links west of lock 31, stone drop box and arch, 17 ft chord, 6 ft. 3 in. rise.
- Number 63, 78 chains west of lock 32, stone box, 2 ft. by 2 ft.
- Number 64, 122 chains west of lock 32, stone arch, 12 ft. chord, 3 ft. rise.
- Number 65, 140 chains west of lock 32, stone drop.
- Number 66, 243 chains, 40 links west of lock 32, stone arch drop, 7 ft. chord, $2\frac{1}{2}$ ft. rise.
- Number 67, 314 chains, 84 links west of lock 32, stone arch culvert.
- Number 68, 29 chains, 20 links west of lock 33, stone semi-circular arch diving, 6 ft. chord, 1 ft. bench walls.
- Number 69, 172 chains, 35 links west of lock 33, stone wooden box, 4 ft. high, 2 ft. wide.
- Number 70, 210 chains west of lock 34, diving, about 8 ft. chord.
- Number 71, 92 chains west of lock 35, stone.
- Number 72, 222 chains, 36 links west of lock 35, stone diving culvert.
- Number 73, 158 chains, 8 links west of lock 39, stone diving culvert.
- Number 74, 199 chains, 94 links west of lock 39, stone diving culvert.
- Number 75, 8 chains west of lock 40, stone arch, about 4 ft. chord.
- Number 76, 107 chains, 80 links west of lock 40, stone diving culvert.
- Number 77, 147 chains, 20 links west of lock 40, stone diving culvert.
- Number 78, 7 chains, 12 links west of lock 41, stone arch drop (double arch), 6 ft. chord, $1\frac{1}{2}$ ft. rise, $2\frac{1}{2}$ ft bench wall.
- Number 79, 26 chains, 75 links west of lock 43, stone box culvert, $4\frac{1}{2}$ ft. wide, 2 openings.
- Number 80, 77 chains, 50 links west of lock 43, stone semi-circular arch, 3 ft. chord, 1 ft. bench walls.
- Number 81, 191 chains, 10 links west of lock 43, stone semi-circular arch, 7 ft. chord, 2 ft. bench walls.
- Number 82, 207 chains, 57 links west of lock 43, stone semi-circular arch, 3 ft. chord, 2 ft. 9 in. bench walls.
- Number 83, 118 chains, 65 links west of lock 45, stone arch, 12 ft. chord, 3 ft. rise, 8 ft. bench walls.
- Number 84, 285 chains, 70 links west of lock 45, stone box, 2 ft. by 2 ft.
- Number 85, 370 chains, west of lock 45, stone box, $2\frac{1}{2}$ ft. wide by 2 ft. high.
- Number 86, 397 chains, 30 links west of lock 45, stone box, $2\frac{1}{2}$ ft. wide, 2 ft. high.
- Number 87, 468 chains, 60 links west of lock 45, stone semi-circle arch, 4 ft. chord, $1\frac{1}{2}$ ft. bench walls.

In addition to the above there are as follows:

One about two miles west of Fort Plain, constructed by the New York, West Shore and Buffalo Railway Co.: it consists of dressed masonry and extends only through the tow-path to drain the bottom of canal level.

One east of Schenectady, between the D. & H. C. Co.'s railroad bridge and Highway bridge No. 55, is a cut stone arch, six foot chord; one about 100 feet east of arch culvert No. 39; two at Yankee hill, respectively one and two miles west of Port Jackson, between culverts 45 and 46; the fifth is about a half mile west of St. Johnsville, between culverts 68 and 69. The four last mentioned are wooden box, about 2 ft. by 2 ft. under the tow-path to the centre of the canal for draining the levels. The sixth at Fink's basin, two miles east of Little Falls, under the waste-weir, cut stone arch, four foot chord; the seventh at the foot of lock 38 at Little Falls, for the feeder is cut stone arch twelve foot chord; the eighth and ninth about three-quarters, and one and one-quarter miles, respectively, east of Mohawk, are wooden box 2 ft. by 2 ft., like those at Yankee hill; tenth at Ilion, between culverts 80 and 81, stone box 2 ft. by 2 ft., and the eleventh is located one-fourth mile east of Frankfort, between culverts 82 and 83, is of cut stone, diving, box 2 ft. by 2 ft. For the Rocky Rift feeder, five miles east of Little Falls under Castle creek, is a large stone box culvert with six openings, each 6 ft. by 3 ft.; also two culverts of stone under Rocky Rift feeder.

One at West Troy under tow-path approach of bridge No. 16, stone arch, ten foot chord, and twenty-four others under various bridge approaches, principally stone box of different sizes. No extensive repairs have been made to any of the culvert structures during the year. A few have had some inexpensive ordinary repairs. Although considerable work has been done in cleaning out the culverts, it was barely enough to keep them open, and only in a very few cases have the culverts been thoroughly cleaned of all the material deposited in them or in the channels from them.

RECOMMENDATIONS.

No. 10, between locks 3 and 4. The south side of the lower wing is badly undermined by the slate rock being washed away, and needs a protection wall under and in front of it; also new planking through the arch, and the masonry should be pointed.

No. 21, at Clutes dry dock. Box with three openings, each 3 ft. by 2 ft., wooden trunk, stone ends. The masonry is in bad condition, tow-path end has settled. The berme end, which was rebuilt but a short time ago, was completely undermined by a break which occurred directly over the structure in August of this year, and will have to be rebuilt. I would recommend that the entire structure be rebuilt of stone. The old wooden trunk culverts are becoming unsafe and should be replaced with stone.

No. 22, on level between locks 18 and 19; small box culvert; masonry-dressed stone. Parapet and wings on tow-path end are badly broken and displaced, and must be relaid soon. A ditch several hundred feet long is badly filled up and should be cleared.

No. 25, located on level between locks 22 and 23 at East Schenec-

tady, dressed stone arch, 13 ft. chord. Part of the wing masonry should be relaid and the structure pointed.

No. 27, located on same level at Schenectady, dressed stone arch. Masonry needs some pointing and more or less excavation in channel.

No. 28, on the same level, one-half mile west of Schenectady, dressed stone arch. The masonry is falling to pieces at the tow-path end of structure, and must be relaid soon; also the ditch should be cleaned.

No. 29, is on the same level, one and one-half miles west of Schenectady, dressed stone. Masonry needs pointing and new planking on bottom of arch, also concrete between foundation timbers and some excavation in creek channel.

No. 37 is located 270 chains west of lock 25. Wooden box through the tow-path is in a very bad condition and should be removed and replaced by bank. There is no necessity for a structure in this place.

No. 40, located on level between locks 27 and 28, dressed stone, double arch, eighteen foot chord. Some new coping and considerable pointing needed, structure and stream filled to within, say an average of two feet of top of arch.

No. 41, on the same level, dressed stone arch, 7 ft. chord. Masonry needs pointing, also a new course of plank over the foundation timbers on the arch and the channel should be excavated.

No. 43, located on same level, dressed stone arch, 6 ft. chord. This culvert has a waste-weir over it. The tow-path wings are crowded over and breaking, and should be repaired.

No. 44, on same level. Vertical wall parapet on tow-path end overhangs masonry. This structure needs cleaning and examining, and channel cleared.

No. 45, situated on same level, about one-fourth of a mile west of Port Jackson, dressed stone masonry, arch, 4' rise, 22 ft. chord. Masonry needs pointing generally, and a large amount of excavating will have to be done to clear the channel.

Not numbered. There are two box culverts through the towing-path at Yankee hill, both of which are old and need repairs.

No. 48, located on level between locks 28 and 29. Some masonry and coping should be relaid and the structure should be pointed, and stream channel cleared.

No. 49, located on level between locks 30 and 31, dressed stone arch, 4 ft. chord; some pointing to be done and new plank needed inside the arch, a portion of the ditch to be opened.

No. 60, located on level between locks 31 and 32, dressed stone arch, 4 ft. chord. Masonry and coping to be relaid and some pointing. Channel to be cleared.

No. 66, located on level between locks 32 and 33, dressed stone arch, 7 ft. chord. The tow-path end is being crowded over. Some masonry should be relaid on the berme side, and the channel should be cleared.

No. 69, located on level between locks 33 and 34, is an old wooden trunk through the tow-path and considered unsafe. A new one is needed.

No. 70, located on level between locks 34 and 35, dressed stone box culvert. The tow-path end is entirely out of sight and is covered with water and earth. Berme end of masonry is badly broken and displaced. Channel should be cleared.

No. 73, located on level between locks 39 and 40, dressed stone box, 14 ft. parapet wall. Masonry at tow-path end is badly broken and displaced. The berme end should be pointed and the channel cleared.

No. 76 is on the same level, dressed stone box, 8 ft. parapet wall. Tow-path end masonry is badly displaced and should be relaid.

No. 77, located on same level is the same kind of structure and in the same condition.

No. 78, located on level between locks 41 and 42, dressed stone double arch, six foot chord. Some masonry to be relaid on berme end and new planking needed.

No. 80, located on level between locks 43 and 44, dressed stone arch, 3 ft. chord. Masonry to be relaid on tow-path end and the rest pointed; also the ditch to be opened.

No. 89, located on level between lock 45 and west end of this division, dressed stone box culvert. Tow-path end has masonry broken up and displaced, which should be relaid.

No. 90, located on level between lock 45 and west end of this division, dressed stone arch, 6 ft. chord. Masonry on tow-path is broken up and displaced and needs relaying. Berme end has no parapet or wings. About forty feet of this end of the arch is of small poor stone, some of which have fallen out of the inside of the arch, rendering it unsafe and it should be rebuilt.

Many culverts under bridge approaches need more or less repairs.

Rocky Rift Feeder culvert under Castle creek, consists of six openings, each 6 ft. x 3 ft. The paving protection over the covering stone has been entirely washed away, and some of the covering has been displaced, causing more or less leakage from the feeder into the creek, besides endangering the safety of the structure; the covering should be relaid, new paving laid secured by anchor timbers and plank, also portions of the wing walls above and below the structure relaid, and the masonry should be pointed, with other slight repairs.

Many culverts need thorough pointing, as very little mortar remains in the joints, which are partially filled with roots, weeds and grass. This, together with some leaking, leaves the masonry in a condition to be seriously injured by frost from year to year. Much of the above masonry mentioned as being broken and displaced has been rendered so by the action of the frost, through neglect in pointing the same.

The channels and ditches above and below many of these structures need more or less cleaning.

ERIE CANAL BRIDGES.

The following table gives a list and location of the most important bridges on the eastern division of the Erie canal, classified as follows: Forty-two road, thirty-four street, ninety-eight farm, five change, one foot, five tow-path and eight railroad bridges.

Between Locks 1 and 2.

Number.	NAME.	Location.	Plan.	Material.	Span.
1....	Road	Sta. O + to O +	Whipple cast iron arch	Iron	48
2....	Street	Sta. 11.31 to 11.85	Wrought iron swing	Iron .....	.....
3....	Road	Sta. 16 + 45 to 17	Whipple trapezoidal truss	Iron	113
4....	Road	Sta. 53 48 to 53 + 75	Wrought iron arch truss	Iron .....	.....
5....	Foot	Sta. 82.90 to	Suspension foot bridge	Wood	98

Between Locks 2 and 3

6....	Farm	Sta. 47 + 53 to 47 + 80.	wooden Whipple truss	Wood	72
7....	Road	Sta. 114. to 114 28.	Wooden Whipple truss	Wood	71 6
8....	Road	Sta. 134 43 to 134 82.	Whipple cast iron arch	Iron	78 4
9....	Road	Sta. 157. to 157 42.	Whipple wooden truss	Wood	82
10....	Road	Sta. 186. tc 186 42.	Whipple wooden truss	Wood	83 3
11....	Street	Sta. 215 28 tc 215 60.	Whipple wooden truss	Wood	81 6
12....	Street	Sta. 243 35 to 243 72.	Whipple wooden truss	Wood	76
13....	Street	Sta. 260 80 to 261 14.	Whipple wooden truss	Wood	82 6
14....	Street	Sta. 268 70 to 269 34.	Wrought iron lattice	Iron .....	.....
15....	Street	Sta. 290 to	U. S. Arsenal bridge, wooden	Wood .....	.....
16....	Street	Sta. 302 to	U. S. Arsenal bridge, cast pipe arch .....	.....	.....
17....	Street	Sta. 312 41 to 312 73.	Whipple cast iron arch	Iron	91
18....	Street	Sta. 320 40 to 321 46.	Whipple cast iron arch	Iron	81
19....	Street	Sta. 338 58 to 339 48.	Wrought iron arch truss	Iron	84 6

20....	Street.....	Sta. 350 + 11 to 350 + 57.	Whipple cast iron arch	Iron	81	6
21....	Change	Sta. 363 38	Wrought iron pipe arch.....	Iron.....	94	
22....	Street.....	Sta. 365 47 to 365 90.	Cast iron pipe arch truss.....	Iron.....	80	6
23....	Street.	Sta. 379 74 to 380 24.	Whipple cast iron arch.....	Iron.....	81	6
24....	Road.....	Sta. 400 74 to 401 67.	Wrought iron Warren truss.....	Iron.....	.....
25....	Change.....	Sta. 415 12 to 415 78.	Whipple trapezoidal truss.....	Iron.....	120	

No. 38.]

Between Locks 3 and 4.

26....	Railroad.....	1-2 chains below lock 4.	Whipple trapezoidal truss.....	Iron.....	
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Between Locks 4 and 5.

27....	Road.....	3 chains above lock 4.....	Town's wooden lattice truss.....	Wood.....	110	
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Between Locks 8 and 9.

28....	Road.....	5 chains below lock 9.....	Whipple cast iron arch.....	Iron.....	109	9
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37

Between Locks 12 and 13.

29....	Street.....	Halfway between locks...	Whipple cast iron arch truss.....	Iron.....	111	
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Between Locks 13 and 14.

30....	Street.....	8 chains above lock 13.....	Whipple trapezoidal truss..	Iron.....	110	
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Between Locks 15 and 16.

31....	Street.....	4 chains below lock 16.....	Whipple trapezoidal truss.....	Iron.....	121	
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Between Locks 17 and 18.

32....	Farm.....	4 chains below lock 18.....	Whipple wooden truss.....	Wood.....	99	10
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BRIDGES — (Continued.)
Between Locks 18 and 19.

Number.	NAME.	Location.	Plan.	Material.	Span.
33....	Change.....	Sta. 13 + 80 to 14 + 20.	Whipple cast iron arch truss....	Iron.....	80 6
34....	Farm.....	Sta. 57 8 to 57 36.	Whipple wooden truss.....	Wood.....	72 4
35....	Farm.....	Sta. 128 11 to 128 45.	Whipple wooden truss.....	Wood.....	72 6
36....	Farm.....	Sta. 168 96 to 169 20.	Whipple wooden truss.....	Wood.....	70 6
37....	Change.....	Sta. 217 88 to 218 28.	Whipple cast iron arch truss.....	Iron.....	72
38....	Road.....	Sta. 244 15 to 244 45.	Whipple wooden truss.....	Wood.....	86 4
39....	Farm.....	Sta. 340 21	Whipple wooden truss.	Wood.....	72
40....	Farm.....	Sta. 369 to 369 28.	Whipple wooden truss.....	Wood.....	71 9
41....	Farm.....	Sta. 432 37 to 432 55.	Whipple wooden truss.....	Wood.....	72
42....	Road.....	Sta. 511 95 to 512 25.	Whipple wooden truss.....	Wood.....	89
43....	Farm.....	Sta. 521 52 to 521 82.	Whipple wooden truss.....	Wood.....	70 4
44....	Farm.....	Sta. 542 93 to 543 20.	Whipple wooden truss.....	Wood.....	70 9
45....	Farm.....	Sta. 567 94 to 568 24.	Whipple wooden truss.....	Wood ..	72
46....	Road.....	Sta. 598 42 to 598 75.	Iron pin connection	Iron.....	70
47....	Farm.....	Sta. 633 65 to 633 95.	Whipple wooden truss.....	Wood.....	70 4
48....	Farm.....	Sta. 642 12 to 642 42.	Whipple wooden truss.....	Wood.....	69
49....	Farm.....	Sta. 658 40 to 658 70.	Whipple wooden truss.....	Wood.....	71 6
50....	Farm.....	Sta. 693 41 to 693 73.	Whipple wooden truss.....	Wood.....	73

Between Locks 19 and 20.

51....	Farm.....	Sta. 56 to 56+20	Whipple wooden truss.....	Wood.....	71
52....	Road.....	Sta. 69+55 to 69+85.....	Whipple wooden truss.....	Wood.....	74

Between Locks 20 and 21.

53....	Road	Sta. 108 + 80 to 109 + 4..	Whipple wooden truss.....	Wood.....	72	6
54....	Change	Sta. 250 32 to 250 52..	Whipple wooden truss.....	Wood.....	87	6
55....	Tow-path	Sta. 255 to 255 60..	Whipple wooden truss.....	Wood.....	42	3

Between Locks 21 and 22.

56....	Tow-path ..	Sta. 928 + to 9 + 64	Draw bridge	Wood.....	.....	.....
57....	Farm	Sta. 12 + 12 to 12 + 36....	Whipple wooden truss.....	Wood.....	93	4

Between Locks 22 and 23.

58....	Road	Sta. 24 + 34 to 24 + 60..	Wooden whipple truss.....	Wood.....	72	6
59....	Farm	Sta. 142 92 to 143 16..	Wooden whipple truss.....	Wood.....	72	3
60....	Farm	Sta. 161 68 to 161 92..	Wooden whipple truss.....	Wood.....	71	6
61....	Road	Sta. 230 12 to 230 44..	Wooden whipple truss.....	Wood.....	72	6
62 ..	Road	Sta. 264 88 to 265 12..	Wooden whipple truss.....	Wood.....	79	3
63....	Street.....	Sta. 284 23 to 284 65..	Whipple cast iron arch truss	Iron.....	72	6
64....	Street.....	Sta. 304 78 to 305 26..	Whipple wooden truss.....	Wood.....	81	.....
65....	Street.....	Sta. 311 22 to 311 90..	Whipple cast iron arch truss	Iron.....	92	.....
66....	R. Road.....	Sta. 318 to 320 20..	Wrought iron lattice	Iron.....	.....	.....
67....	Street.....	Sta. 323 15 to 324 80..	Whipple cast iron arch truss	Iron.....	90	.....
68....	Street.....	Sta. 331 12 to 331 80..	Wrought iron arch	Iron.....	.....	.....
69....	Street.....	Sta. 337 7 to 338 36..	Wrought iron trapezoidal truss.....	Iron.....	73½	.....
70....	Street.....	Sta. 354 6 to 354 42..	Whipple wooden truss.....	Wood.....	72	.....
71....	Street.....	Sta. 365 78 to 366 36..	Whipple wooden truss.....	Wood.....	78	.....
72....	Farm	Sta. 504 36 to 504 64..	Whipple wooden truss.....	Wood.....	70

Between Locks 23 and 24.

73....	Farm	Sta. 8 + 87 to 9 + 14..	Wrought iron	Iron.....
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BRIDGES — (Continued).

Between Locks 24 and 25.

Number.	NAME.	Location.	Plan.	Material.	Span.
					ft. in.
74....	Road	Sta. 49 + 64 to 50 + 1.....	Wrought iron	Iron .....	.....
75....	Road	Sta. 99 18 to 99 58.....	Whipple wooden truss.....	Wood.....	81 9
76....	Farm	Sta. 126½	Wooden whipple truss (private)	Wood.....	82 6
77....	Road	Sta. 181 + 36 to 181 + 72..	Whipple wooden truss.....	Wood.....	77 6
78....	Farm	Sta. 218 2 to 218 28..	Whipple wooden truss.....	Wood.....	70
79....	Farm	Sta. 294 33 to 294 61..	Whipple wooden truss.....	Wood.....	71 9

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Between Locks 25 and 26.

80....	Farm	Sta. 9 + 25 to 9 + 50..	Whipple wooden truss.....	Wood.....	71
81....	Farm	Sta. 40 25 to 40 50..	Whipple wooden truss.....	Wood.....	71 6
82....	Farm	Sta. 73 76 to 74 2..	Whipple wooden truss.....	Wood.....	70 6
83....	Road	Sta. 117 40 to 117 76..	Whipple wooden truss.....	Wood.....	79 6
84....	Road	Sta. 185 78 to 186	Whipple wooden truss.....	Wood.....	71
85....	Farm	Sta. 365 3 to	Whipple wooden truss.....	Wood.....	89
86....	Farm	Sta. 398 53 to 398 75..	Whipple wooden truss.....	Wood.....	71
87....	Farm	Sta. 460 to 460 20..	Whipple wooden truss.....	Wood.....	75

Between Locks 26 and 27.

88....	Farm	Sta. 12 + 56 to 12 + 78..	Whipple wooden truss.....	Wood.....	87
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Between Locks 27 and 28.

89...	Street.....	Sta. 202 + 92 to 203 + 48..	Whipple cast-iron arch truss	Iron.....	72	6
90...	Street.....	Sta. 211 8 to 211 56.	Whipple cast-iron arch truss	Iron.....	75	

Between Locks 28 and 29.

91...	Farm.....	Sta. 85 + 70 to 85 + 94. ..	Whipple wooden truss (private).....	Wood.....	89	6
92...	Farm.....	Sta. 138 to 138 22...	Whipple wooden truss.....	Wood.....	70	6

Between Locks 29 and 30.

93...	Farm.....	Sta. 30 + to 30 + 22.....				
94...	Road	Sta. 49 60 to 50 2.....	Whipple cast-iron arch truss	Iron.....	98	3

Between Locks 30 and 31.

95...	Farm.....	Sta. 51½ + to 52 +	Wooden whipple truss.....	Wood.....	71	6
96...	Farm.....	Sta. 123 33 to 123 55..	Wooden whipple truss.....	Wood.....	83	6
97...	Farm.....	Sta. 152 28 to 152 50..	Wooden whipple truss.....	Wood.....	83	9
98...	Farm.....	Sta. 181 8 to 181 32..	Wooden whipple truss.....	Wood.....	71	
99...	Farm.....	Sta. 219 72 to 219 96..	Wooden whipple truss.....	Wood.....	86	6
100...	Farm.....	Sta. 253 36 to 253 60..	Wooden whipple truss.....	Wood.....	69½	
101...	Road	Sta. 280 50 to 280 92..	Queen post truss.....	Iron.....	95	
102...	Farm.....	Sta. 306 6 to 306 28..	Whipple wooden truss.....	Wood.....	70	
103...	Farm.....	Sta. 344 96 to 345 28..	Whipple wooden truss.....	Wood.....	68½	
104...	Road	Sta. 393 52 to 393 88..	Wooden whipple truss.....	Wood.....	70	6
105...	Tow-path	Sta. 397 92 to 398 29..	Wooden whipple truss.....	Wood.....	63	
106...	Street.....	Sta. 412 4 to 412	Whipple cast-iron arch.....	Iron.....	72	9
107...	Street.....	Sta. 420 96 to 421 18..	Whipple cast-iron arch truss	Iron.....	75	6
108...	Farm.....	Sta. 482 64 to 482 90..	Whipple wooden truss.....	Wood.....	72	
109...	Farm.....	Sta. 538 90 to 539 16..	Whipple wooden truss.....	Wood.....	73	9
110...	Farm.....	Sta. 612 50 to 612 75..	Whipple wooden truss.....	Wood.....	71	

BRIDGES — (Continued).

Number.	NAME.	Location.	Plan.	Material.	Span.
111...	Farm.....	Sta. 736 + 82 to 737 + 18.	Whipple wooden truss.....	Wood.....	Ft. 71
112...	Farm.....	Sta. 813 50 to 813 75.	Whipple wooden truss.....	Wood.....	71
113...	Farm.....	Sta. 828 to 828 25.	Whipple wooden truss.....	Wood.....	71
114...	Farm.....	Sta. 928 50 to 928 75.	Whipple wooden truss.....	Wood.....	70
115...	Farm.....	Sta. 941 2 to 941 27.	Whipple wooden truss.....	Wood.....	76
116...	Farm.....	Sta. 1079 8 to 1079 33.	Whipple wooden truss.....	Wood.....	70 6
Between Locks 31 and 32.					
117...	Farm.....	Sta. 4 + 98 to 5 + 20..	Whipple wooden truss.....	Wood.....	63 6
118...	Road.....	Sta. 17 46 to 17 82..	Whipple cast-iron arch truss.....	Iron.....	70
119...	Farm.....	Sta. 49 to 49 28.	Whipple wooden truss.....	Wood.....	71 9
120...	Farm.....	Sta. 82 64 to 82 92..	Whipple wooden truss.....	Wood.....	70 6
121...	Farm.....	Sta. 142 33 to 142 55..	Whipple wooden truss.....	Wood.....	70 6
122...	Farm.....	Sta. 205 66 to 205 88..	Whipple wooden truss.....	Wood.....	71 6
123...	Farm.....	Sta. 241 76 to 241 98..	Whipple wooden truss.....	Wood.....	69 9
124...	Street.....	Sta. 259 66 to 260 17..	Whipple cast-iron arch truss.....	Iron.....	81
125...	Farm.....	Sta. 314 15 to 314 37..	Whipple wooden truss.....	Wood.....	72
126...	Farm.....	Sta. 370 34 to 370 58..	Whipple wooden truss.....	Wood.....	70
127...	Farm.....	Sta. 475 40 to 475 68..	Whipple wooden truss.....	Wood.....	69 9
Between Locks 32 and 33.					
128...	Farm.....	Sta. 10 82 to 11 8...	Whipple wooden truss.....	Wood.....	71
129...	Street.....	Sta. 27 98 to 28 43...	Cast-iron pipe arch truss.....	Iron.....	71 9

130...	Farm.....	Sta.	59+52 to 59+76..	Whipple wooden truss.....	Wood.....	72
131...	Farm.....	Sta.	89 88 to 90 9..	Whipple wooden truss.....	Wood.....	70 6
132...	Farm.....	Sta.	242 65 to....	Whipple wooden truss (private).....	Wood.....	
133...	Farm.....	Sta.	337 16 to 337 40..	Whipple wooden truss.....	Wood.....	72

Line.

Between Locks 33 and 34.

134...	Farm.....	Sta.	23+66 to 23+92 .	Whipple wooden truss.....	Wood.....	71 10
135...	Road	Sta.	65 90 to 66 15 .	Whipple wooden truss.....	Wood.....	81 9
136...	Farm.....	Sta.	175 70 to 175 95 .	Whipple wooden truss.....	Wood.....	71
137...	Farm.....	Sta.	195 97 to 196 22 .	Whipple wooden truss.....	Wood.....	71 6
138...	Tow-path	Sta.	199 70 to 200 10 .	Over Rocky Rift feeder.....	Wood.....	26

Between Locks 34 and 35.

139...	Road	Sta.	8+ 8 to 8 +35 .	Whipple wooden truss.....	Wood.....	72 6
140...	Farm.....	Sta.	45 36 to 45 64 .	Whipple wooden truss.....	Wood.....	81 43
141...	Farm.....	Sta.	71 56 to 71 82 .	Whipple wooden truss.....	Wood.....	71
142...	Road	Sta.	94 4 to 94 30..	Whipple wooden truss.....	Wood.....	71
143...	Farm.....	Sta.	128 32 to 128 57..	Whipple wooden truss.....	Wood.....	71 3
144...	Farm.....	Sta.	173 95 to 174 20..	Whipple wooden truss.....	Wood.....	72
145...	Farm.....	Sta.	217 40 to 217 62..	Whipple wooden truss.....	Wood.....	70
146...	Farm.....	Sta.	241 40 to 241 65..	Whipple wooden truss.....	Wood.....	70

Between Locks 35 and 36.

147...	Farm.....	Sta.	34+85 to 35+10 .	Whipple wooden truss.....	Wood.....	70
148...	Farm.....	Sta.	71 12 to 71 35..	Whipple wooden truss.....	Wood.....	72
149...	Farm.....	Sta.	216 45 to 216 70..	Whipple wooden truss.....	Wood.....	71 6
150...	Road	Sta.	289 91 to 290 21..	Whipple wooden truss.....	Wood.....	72 6

BRIDGES — (Continued).

Between Locks 38 and 39.

Number.	NAME.	Location.	Plan.	Material.	Span.
					ft. in.
151...	Tow-path	Sta. 2+75 to 3+7.....	Wood over Little Falls side cut.....	Wood.....	.....
152...	Road	Sta. 7 65 to 8 10.....	Cast iron pipe arch truss.....	Iron.....	73

Between Locks 39 and 40.

153...	Road	Sta. 6+2 to 6+30..	Whipple wooden truss.....	Wood.....	77 6
154...	Road	Sta.....	Wrought iron lattice, village Little Falls	Iron.....	.....
155...	Farm.....	Sta. 97 32 to 97 60..	Whipple wooden truss.....	Wood.....	73
156...	Farm.....	Sta. 178 25 to 178 52..	Whipple wooden truss.....	Wood.....	72

Between Locks 40 and 41.

157...	Farm.....	Sta. 72+92 to 73+16.	Whipple wooden truss.....	Wood.....	72 6
158...	Farm.....	Sta. 160 40 to 160 66..	Whipple wooden truss.....	Wood.....	70 6
159...	Farm.....	Sta. 197 20 to 197 52..	Whipple wooden truss.....	Wood.....	72

Between Locks 41 and 42.

160...	Farm.....	Sta. 30 + to 30+26..	Whipple wooden truss.....	Wood.....	71
161...	Road	Sta. 109 to 109 50..	Whipple wooden truss.....	Wood.....	70 6
162...	Road	Sta. 180 28 to 181 3.	Whipple cast iron arch truss	Iron	79
163...	Farm.....	Sta. 223 12 to 223 40..	Whipple wooden truss.....	Wood.....	75 6

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Between Locks 43 and 44.

164...	Farm.....	Sta. 31+	8 to 31+40.	Whipple wooden truss.....	Wood.....	76	6
165...	Street.....	Sta. 67	70 to 67 96.	Whipple wooden truss.....	Wood.....	72	
166...	Street.....	Sta. 86	92 to 87 72.	Cooper wrought iron arch truss.....	Iron.....	73	
167...	Street.....	Sta. 107	92 to 108 25..	Mosely wrought iron arch truss.....	Iron.....	72	
168...	Farm.....	Sta. 150	47 to 150 75..	Whipple wooden truss.....	Wood.....	71	6
169...	Road	Sta. 185	40 to 186 32..	Phoenix trapezoidal iron truss.....	Iron.....	117	
170...	Road	Sta. 197	24 to 197 68..	Whipple cast iron arch truss	Iron.....	74	

Between Locks 44 and 45.

171...	Farm.....	Sta. 11+32	to 11+60....	Whipple wooden truss.....	Wood.....	72	6
172...	Farm.....	Sta. 45	60 to 45 90....	Whipple wooden truss.....	Wood.....	75	6
173...	Street.....	Sta. 77	12 to 77 46....	Whipple wooden truss.....	Wood.....	72	
174...	Road	Sta. 91	36 to 91 90....	Whipple wooden truss.....	Wood.....	78	3

Between Lock 45 and East Line of Oneida county.

175...	Road	Sta. 6+52	to 7+ 8..	Whipple cast iron arch truss	Iron.....	72	
176...	Farm.....	Sta. 37	12 to 37 42..	Whipple wooden truss.....	Wood.....	72	
177...	Road	Sta. 74	40 to 74 70..	Whipple wooden truss.....	Wood.....	74	
178...	Farm.....	Sta. 96	15 to 96 40.	Whipple wooden truss.....	Wood.....	70	6
179...	Farm.....	Sta. 139	16 to 139 40..	Whipple wooden truss.....	Wood.....	71	3
180...	Farm.....	Sta. 186	92 to 187 17..	Whipple wooden truss.....	Wood.....	69	6
181...	Farm.....	Sta. 217	70 to 217 95..	Whipple wooden truss.....	Wood.....	70	
182...	Farm.....	Sta. 296	60 to 296 85..	Whipple wooden truss.....	Wood.....	71	
183...	Farm.....	Sta. 327	95 to 328 20..	Whipple wooden truss.....	Wood.....	71	
184...	Farm.....	Sta. 363	76 to 364 4..	Whipple wooden truss.....	Wood.....	72	
185...	Farm.....	Sta. 386	94 to 387 18..	Whipple wooden truss.....	Wood.....	70	
186...	Road	Sta. 441	88 to 442 16..	Whipple wooden truss.....	Wood.....	72	6
187...	Road	Sta. 466	40 to 466 65..	Whipple wooden truss.....	Wood.....	72	6
188...	Farm.....	Sta. 495	55 to 495 80..	Whipple wooden truss.....	Wood.....	71	9

BRIDGES — (Continued.)

There are, in addition to those in the table, bridge over entrance to Albany weigh lock, iron pipe truss, span 42 feet.
Between Locks 18 and 19.

Number.	NAME.	Location.	Plan.	Material.	Span.
.....	Sta. 20+30.....	Suspension foot bridge (private).....	.....	ft. in.
.....	Sta. 250 67.....	Suspension foot bridge (private).....	.....	.....
.....	Sta. 251 6.....	Noxon's dry dock double lift bridge.....	.....	.....
.....	Sta. 274 80.....	Suspension foot bridge (private).....	.....	.....
.....	Sta. 303 80.....	Suspension foot bridge (private).....	.....	.....
.....	Sta. 315 30.....	Suspension foot bridge (private).....	.....	.....
Between Locks 30 and 31.					
.....	Sta. 384+80.....	Foot bridge, wooden Whipple (private).....	Wood.....	.....
.....	Sta. 402 36.....	Foot bridge, wooden Whipple (private).....	Wood.....	.....
Between Locks 31 and 32.					
.....	Sta. 267 1-2.....	Foot bridge, wooden Whipple (private).....	.....	.....
.....	Sta. 285 1-2.....	Foot bridge, wooden Whipple (private).....	.....	.....
Between Locks 32 and 33.					
.....	Sta. 22+95.....	Suspension bridge, iron.....	.....	.....
Between Locks 34 and 35.					
.....	Sta. 128+32.....	Bridge over feeder.....	Wood.....	30'
.....	Sta. 173 95.....	Bridge over feeder.....	Wood.....	30'

Between Locks 35 and 36.

.....	Sta. 286+35.....	Suspension foot bridge.....	Wood.....
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Between Locks 39 and 40.

.....	Sta. 64+20.....	Two abutments, no bridge.....
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Between Locks 40 and 41.

.....	Sta. 48+68.....	Suspension foot bridge, wood, Whipple (p'v't)	Wood.....
.....	Sta. 12 70.....	Two abutments, no bridge.....	.....

Between Locks 41 and 42.

.....	Sta. 46+75.....	Suspension foot b'ge, wooden, Whipple (p'v't)|	.....
.....	Sta. 130 5.....	Suspension foot b'ge, wooden, Whipple (p'v't)|	.....
.....	Sta. 211 70.....	Suspension foot b'ge, wooden, Whipple (p'v't)|	.....

Between Locks 45 and 46.

.....	Sta. 380+90.....	Pillars for foot bridge, no bridge.....	.....
.....	Sta. 415 30.....	Suspension foot bridge.....	.....

NOT NUMBERED.

NAME.	Location.	Plan.		Material.
Railroad	Between Schenectady and Hoffman's	Wrought iron....	B. H. T. & W. R.:	Iron.
Railroad	Below lock No. 32.....	Wrought iron....	N. Y., W. S. & B. R	Iron.
Railroad	One and three-fourths miles above lock No. 32...	Wrought iron....	N. Y., W. S. & B. R	Iron.
Railroad	At Mohawk.....	Wrought iron....	N. Y., W. S. & B. R	Iron.
Railroad	Ferguson's Creek below Utica.....	Wrought iron....	N. Y., W. S. & B. R	Iron.

ERIE CANAL — BRIDGES.

The bridges on this division of the Erie canal are for the most part in good condition.

Numbers 61, 112 and 113 should be rebuilt.

Several bridge abutments on the berme side of the canal are considered in a dangerous condition, and many others are gradually becoming unsafe in consequence of having settled and being crowded over by the embankment. Some are now leaning into the canal with the masonry overhanging from three to fifteen inches. These abutments may be brought nearly into their original position, especially where the masonry is not broken or displaced, by removing the embankment back of them and excavating under the rear of the foundation, allowing that portion to settle, thus bringing them into place.

This was done during the year at bridge 115, the first above Meyers' creek aqueduct, and has proved to be a good strong piece of work.

Some of the abutments have portions of the masonry and coping displaced and need pointing.

All of the old abutments being too low to give twelve feet clearance from the water surface to the lowest points of the bridges, have been blocked up with wood and should be lengthened and raised with stone. This can be done by making the slope of the steps for three or four courses from the top, one to one.

I would recommend, as my predecessors have, that iron bridges be substituted to take the place of the wooden ones now in use.

From Schoharie Creek to Canajoharie, the bridge abutments have been thoroughly repaired and repointed, greatly improving the strength and appearance of the structures.

One and one-quarter miles west of Little Falls, the village of Little Falls constructed an iron highway bridge and abutments during the year.

ERIE CANAL — PRISM AND BANKS.

The prism is in fair condition. The slope wall needs repairing from a point two feet below the surface of the water. The tow-path banks are in many places low and are being raised. The Superintendent of Public Works is now using four large boats on this work, and by another season will have them at their proper height; when this is done the slope walls should be carried up and the pavement relaid.

The vertical walls require constant repairs, much of it having been improperly constructed and of a poor quality of stone.

Much of the docking is in bad condition, being very much decayed and should be renewed. That portion of the Schenectady level from the city west nearly two miles was originally constructed with timber and plank docking on both sides of the canal, which has now become old and unsafe and requires constant attention. I would respectfully recommend, that a vertical wall in cement, placed on a broad timber foundation, be constructed in place of this docking.

Another similar piece of docking has been in use for some time on the inside of the tow-path at Big Nose. This is more dilapidated than that at Schenectady, and has portions leaning into the canal which

may fall in if not soon attended to. I would recommend a similar vertical wall to be constructed at this point, also that the leaky places in the bottom of the canal at this point be covered with concrete.

Between locks 20 and 21 on the berme side, the slate rock which gave so much trouble creating bars has been dredged out which has greatly improved this portion of the canal.

ERIE CANAL — BREAKS.

Two breaks have occurred on this canal during the year; the first on the fourteen mile level, June 18, at a point about 100 feet west of the first waste-weir below lock 31, on the tow-path side, delaying navigation but for a few days. It started Tuesday night at 11:30 and was caused by muskrats burrowing in the bank. The opening was about twenty feet long and five feet deep, about 350 cubic yards of embankment being washed out. The promptness and efficiency of the section superintendent prevented a serious delay. A dam was thrown across the break and material being obtained within a distance of 500 feet, by Wednesday, P. M., water was let into the level. During the repairs it was found that muskrat holes extended in all directions through the bank at this place.

The second break occurred on the berme side, between locks 18 and 19, over the culvert next to Clutes Dry Dock on Tuesday, August 12. The water broke through the bottom of the canal over the culvert, which has a wooden trunk, and following the same, worked under the parapet and wing walls, causing so much settlement that it will be necessary to rebuild the same; a crib was built in the canal around the damaged portion and filled with puddled clay. This caused about one week delay. The work was thoroughly done under the direct supervision of Assistant Superintendent of Public Works, J. D. Hancock.

CHAMPLAIN CANAL.

This canal, though still badly needing extensive repairs, is in much better condition than at the close of the last year. Little permanent improvement has been effected out of the ordinary repair fund, as the mere keeping of it in navigable condition taxes this fund to its utmost limits. Both tow-path and berme banks are largely made of clay and sand without either timber or stone protection. A large portion of the tow-path was originally protected with a slope wall and dock stick, but the slope wall having been built when there was only five feet of water carried in this canal, the prism is now excavated below this wall which is in many places in a dilapidated condition, and the dock sticks rotten and useless. In consequence of this fact, the water is gradually but constantly encroaching on the banks, thus narrowing the tow-path and endangering the stability of the embankments, and also filling in the bottom of the canal and thus decreasing the depth of water therein. The masonry on this canal is in very fair condition; during the past five years much of it has been rebuilt, and much more is now under contract.

CHAMPLAIN CANAL—DAMS.

Number 1 is located at Troy, across the Hudson river. The dam is 1,100 feet long and eleven feet high ; it is built of timber cribs filled with stone and covered with timber drift bolted, binding the cribs together. These timbers, together with the longitudinal timbers to which they are bolted, have become very much worn and some of them are loose and liable to be washed out at times of freshets, and have already caused many leaks.

The covering of the dam should be removed, the cribs repaired and a new hard wood or a Georgia pine timber covering put on. The upper side of the dam should be repaired and thoroughly lined with gravel to stop the numerous leaks.

I would recommend that gravel and brush be put in at the upper side of the dam to stop the leakage. The river channel below the lock could be dredged out and straightened, and the material thus obtained be transported through the sloop lock and dumped on the upper side of the dam. The sloop lock pier which is the east anchorage of the dam has been thoroughly repaired and strengthened this year by means of a new crib of timber and stone placed on the outside, and running from the line of the crest of the dam along the west and south face of the old pier to the foot of the lock.

Number 2 is located at Cohoes in Albany county, across and at the mouth of the Mohawk river, built on solid rock. The abutments and dam proper are of cut stone, with an apron of timber and stone cribbing. The ridge of the dam is 1,616 feet long and twelve feet high. About seventy-five feet of the apron at the north end was washed out by the spring freshets, and one coping stone broken and carried away ; this has all been repaired and the structure is now in good condition.

Number 3, known as the Saratoga Dam, is located at Northumberland, in Washington and Saratoga counties, across the Hudson river. The entire structure is of cut stone on a rock foundation, the dam itself being 740 feet long and twelve feet high, is a substantial structure in good condition.

Number 4 is located near Fort Ann, in Washington county, on the berme side of the canal across Wood creek, near the head of lock 19. This is a stone dam with cut stone abutments, having a spillway of 120 feet and is in fair condition. Some of the masonry has been displaced and the structure needs pointing.

Nos. 5, 6 and 7 are located just south of Lock No. 20, across branches of Wood Creek. No. 5 is a cut stone dam and abutments with a spillway of sixty feet in fair condition. No. 6 is a cut stone dam and abutments with a spillway of forty-eight feet in fair condition. No. 7 is a tree dam with a spillway of 110 feet, has rubble masonry abutments and is in fair condition.

No. 8 is located about two miles west of Glens Falls, in Warren county, across the Hudson river. This dam is composed of timber cribs filled with stone, covered with timber, and built on a rock foundation. The dam proper is 618 feet long, fourteen feet high and raises the water about ten feet. The abutments and feeder bulkhead are of cut stone. The old dam was constructed many years since, but within a few years has been rebuilt, making it double the original width, also increasing the elevation.

CHAMPLAIN CANAL — LOCKS.

There are eighteen lift and five guard locks on the Champlain canal. Two of the guard locks are at the Mohawk river, at Cohoes; two at the Hudson river, at Northumberland, and one about half way between Fort Ann and Whitehall, near the Wood Creek feeder dams.

There are also three lift locks combined on the Waterford side cut and one weigh lock at Waterford. All of the above mentioned locks are 110 feet by 18 feet each in the chamber with various lifts, as shown by the accompanying table. All the locks are on the enlarged plan and of the same size as those on the Erie canal.

There is also one river lock at the head of navigation on the Hudson connecting with the pond above the Troy dam, which is 115 feet by 30 feet in the chamber.

CHAMPLAIN CANAL — LOCKS.

Number.	NAMES.	Feet, lift.
1.	Cohoes lock.....	+11.5
2.	Cohoes lock.....	+11.5
3.	Guard lock, south side Mohawk river.....	0.0
4.	Guard lock, north side Mohawk river.....	—0.280
5.	Lock above Waterford.....	+13.270
6.	Lock above Waterford.....	+11.348
7.	Flynn's lock.....	+9.288
8.	Hewett's lock.....	+11.095
9.	Becker's lock.....	+8.297
10.	South guard lock, Northumberland:.....	0.0
11.	Saratoga guard lock, Northumberland.....	+9.92
12.	Bassett's lock.....	+9.295
13.	Fort Miller lock.....	+9.787
14.	Moses Kill lock.....	+9.098
15.	Fort Edward, summit level.....	+8.00
16.	Upper combined, Fort Ann.....	—8.24
17.	Lower combined, Fort Ann.....	—8.137
18.	Lower combined, Fort Ann.....	—7.109
19.	Parish lock, Wood Creek.....	—2.045
20.	Guard lock, Wood Creek.....	—0.138
21.	First combined, Whitehall.....	—9.00
22.	Second combined, Whitehall.....	—9.00
23.	Third combined, Whitehall.....	—10.00

There is one guard and thirteen lift locks on the Glens Falls feeder, each of which, with the exception of Lock No. 11, which is 110 feet by 18 feet, is 100 feet by 15 feet in the chamber, making a total of forty-one locks on the Champlain canal and Glens Falls feeder. Locks No. 1, 2, 5, 6, 7, 8, 9, 13 and 14 on the Champlain canal and No. 11 on the Glens Falls feeder have tumble gates at the upper end, all the rest have mitre gates.

Lock No. 9 is in very bad condition; there are leaks on both sides of the lock in the chamber for the full length; the joints are all open, and when the lock is full the water penetrates back of the walls and

discharges at the foot of the embankment in a large stream. There also seems to be a leak at the head of the lock ; the walls bulged in and it was found necessary to dress off the face on the berme side. I would recommend that cut-offs, on both sides at the upper end, of masonry or clay puddle be put in, also that the joints be thoroughly pointed with neat Portland cement mortar and that the back of the walls be stripped of earth, and grouted masonry be built against them. This should be done at the close of navigation.

No. 10 has been put in good condition during the past year. Stop gate was put in at head of lock.

The rest of the locks are in fair condition with the exception of pointing and repairs to gates and wickets.

Nearly all the locks need pointing.

GLENS FALLS — FEEDER.

Number.	DESCRIPTION.	Feet. lift.
1. Lower lock.....		10
2, 3. { Combined locks. {	10
	10
4.		10
5.		10
6, 7, 8, { Combined locks.. {	10
9, 10. {	10
	10
	10
11.		11
12. ...		12
13.		10
14. Guard lock at dam.....		

No. 4 is in bad condition ; the upper end should be rebuilt on the enlargement plan and some of the stone on the lower end replaced.

The upper end of lock No. 10 was rebuilt on the enlargement plan during the year.

The rest of the locks are in fair condition, except that the joints need repointing.

The chamber walls of all except Nos. 5, 11 and 14, are too low and should be raised with stone.

The wooden sluiceway around Locks 2, 3, and 4 should be rebuilt, as it is much decayed.

CHAMPLAIN CANAL — AQUEDUCTS.

There are four aqueducts on this canal. The first located at Schuyler-ville ; the second on the level between Locks Nos. 12 and 13 ; the third two or three hundred feet above Lock No. 14, and the fourth at Fort Edward.

No. 1, The north berme wing of masonry has been crowded over ; some stone are displaced on the north tow-path wing which should be relaid and masonry pointed.

No. 2, The south wing on tow-path side, twenty-seven feet long, is settling and bulging out, and a portion of the parapet wall and arch is breaking up and will need relaying to put the structure in complete repair. The berme side masonry is in good order.

No. 3. The foundation of the berme end of the north abutment and wing, which is placed on a shelf of the rock, has crumbled away and the masonry is settling; this should be repaired and all the masonry thoroughly pointed. When all the material is removed from canal bottom the trunk will need lowering several inches, making it necessary to remove the trunk and cut down the masonry.

No. 4. Masonry needs pointing and two new vertical wing walls added on tow-path side.

CHAMPLAIN CANAL — WASTE-WEIRS.

There are twenty-seven waste-weirs on the Champlain canal, and one on the Glens Falls feeder.

Appropriations have been made and contracts let for rebuilding the following waste-weirs:

Burton's, at Waterford; waste-weir between Locks 11 and 12; waste-weir at Lock 20; Eastman's waste-weir; also for building a new spill-way between Locks 5 and 6.

The waste-weir between Locks 8 and 9, just north of Mechanicville, is in a very bad condition and should be rebuilt. The stones are displaced and water leaks through nearly every joint.

The waste-weir at Lansing's mill, at Stillwater, should be rebuilt; is in the same condition as last mentioned.

Empie's waste-weir, the first south of Lock 16, leaks badly and is in a dangerous condition. The masonry has settled badly and should be rebuilt at the close of navigation.

There is only one waste-weir on the Glens Falls feeder, located at Finch, Pruyn & Company's lime-kiln, on the tow-path side, constructed of cut stone, has an arch of eight-foot chord, with bulk-head and spill-way twelve feet wide. The masonry is in bad condition and should be rebuilt.

CHAMPLAIN CANAL — CULVERTS.

There are twenty-six culverts on the Champlain canal; nineteen under the canal, two through the tow-path in the river at Northumberland, two for highways over stream at Waterford, one for feeder at Lock No. 4, two for feeders at Lock No. 10, and also three on the Glens Falls feeder.

Appropriations have been made and contracts let for rebuilding and lengthening the following culverts:

At Thorne's lane, above Lock No. 6, tow-path to be straightened, old wooden trunk removed, and a new diving culvert of stone constructed at right angles to the new inner angle.

The old culvert, three-quarters of a mile south of Fort Miller lock, is to be removed and a new stone diving culvert constructed.

Iron Pipe culvert, three-quarters of a mile north of Moses Kill lock; culvert to be lengthened on berme side so that the bank can be widened and strengthened.

Lander's culvert, between Locks 14 and 15; to be lengthened on the berme side so that the berme bank of the canal can be widened and strengthened; a much needed improvement.

There are only three culverts proper on the feeder; one of cement pipe, twelve inches in diameter, under the canal at Sherman's dry dock; a small stone-box culvert at bridge 115, through the tow-path, for draining level and bottoming the same; also one between Locks 13 and 14, at Brown's bridge, a box culvert with three feet opening. All these in fair condition.

CHAMPLAIN CANAL AND GLENS FALLS FEEDER — BRIDGES.

There are one hundred and fifty-three bridges on the Champlain canal, which includes the bridge across the Mohawk river at Cohoes. There are eleven on the Glens Falls feeder.

In addition to the above-numbered bridges, there are nine railroad bridges, located as follows:

One above the weigh-lock at Waterford, Rensselaer and Saratoga railroad.

One at Mechanicville, Rensselaer and Saratoga railroad.

One between Mechanicville and Lock 9, Boston, Hoosac Tunnel and Western railroad.

One at Fort Edward, Rensselaer and Saratoga railroad.

One at Fort Edward, Glens Falls branch of Rensselaer and Saratoga railroad.

One at Fort Ann, Rensselaer and Saratoga railroad.

Two between Lock 20 and Whitehall, Rensselaer and Saratoga railroad.

One at Whitehall on Rutland branch of Rensselaer and Saratoga railroad.

The Waterford railroad bridge is low and should be raised about one foot.

The railroad bridge on the Rutland branch at Whitehall is low and should be raised four inches.

The Curtis farm bridge above Bemis Heights is low and should be raised six inches.

Appropriations have been made and contracts let for rebuilding the following bridges and raising abutments:

Continuation of Arch street, Green Island, tow-path and berme abutments, and iron highway bridge 100 feet clear span, appropriation of \$6,000 made by Legislature April 15, 1884.

The following are paid for from the extraordinary repair fund re-appropriated by the Legislature April 22, 1882:

Tow-path abutment raised, new berme abutment and superstructure at Division street, Waterford; work completed except a few steps on berme abutment.

Second bridge above Lock 6, new tow-path abutment.

Second bridge south of Lock 9, new tow-path and berme abutments.

New tow-path abutment and superstructure at Stillwater.

First bridge north of Stillwater, new berme abutment and tow-path abutment to be raised.

Two and one-half miles south of Schuylerville, new tow-path and berme abutments and superstructure.

First bridge north of Lock 14, new tow-path abutment and bridge; two new abutments and bridge over escape to waste-weir No. 12.

Bridge No. 96, new berme abutment and bridge; also raising tow-path abutment.

At mouth of Glens Falls feeder, new tow-path and berme abutments and new bridge.

Fifty feet north of Lock 20, new tow-path and berme abutments and new bridge. This is a change bridge and the old change bridge at the mouth of the Glens Falls feeder is to be used here.

Eleven chains north of Lock 20, new tow-path abutment and new bridge. At present this is used as a road and change bridge, and will be used as a road bridge. The change bridge will be placed, as stated above, fifty feet north of the lock.

At first railroad bridge north of Lock 20, new tow-path abutment and bridge.

One mile south of Whitehall, new berme abutment and bridge.

The following bridges and abutments need repairs.

The tow-path and highway bridge across the Mohawk river, at Cohoes, has been repaired and put in as good condition as possible. This bridge is a post combination truss bridge of wood and iron, built in 1872; most of the wood-work should be renewed. The end posts which were rotting away at the foot have been spliced and the flooring renewed this year. Permission has been granted the Cohoes and Waterford Horse Railway to cross, and tracks have been laid on the west side.

Fisher's bridge, below Lock No. 7; the tow-path abutment should be set back so as to give more room between the inner angle of the towing-path and the abutment; as it is now there is scarcely eight feet. This improvement will necessitate the building of a new bridge.

The same recommendations apply to Powers bridge.

Best's bridge opposite the Pulp mills, in Mechanicville, should be repaired and the tow-path abutment rebuilt. This bridge was intended for farm uses, but since the Boston, Hoosac Tunnel and Western Railroad has been completed, side tracks have been laid on the berme side of the canal at this point, and much heavy teaming is done over this bridge and as it now stands it is in a dangerous condition. The tow-path abutment is badly cracked, caused by settlement of the foundation and the face has separated from the backing.

The berme abutment of Baldwin's bridge above Bemis Heights is in bad condition and should be rebuilt, also, the tow-path abutment is low and should be raised.

First bridge north of Ensign's tile works. The tow-path abutment was laid dry with no mortar, and is in bad condition. I would recommend that the bridge be abandoned and the superstructure and material used in some other place. This bridge has not been used for a long time and the land owner says he would not use it if it was put in good condition.

Bridge No. 60. The berme abutment needs repairs, several stones have been knocked out of the wings by passing boats. The superstructure also needs repairs. The bottom chord on the north side is broken and has been repaired temporarily.

Many of the bridges have sway braces of wood; these should be replaced with iron.

Many of the abutments are low, the bridges being placed on blocks of wood; these should be raised with stone.

The following bridges have been rebuilt and paid for from the ordinary repair fund, by the Superintendent of Public Works:

Road bridge on Fourth street over Waterford sidecut; road bridge at Burton's saw mill, Waterford; Road bridge with one sidewalk at Cemetery street, Mechanicville; road bridge with one sidewalk, William street; Mechanicville and Stratton's road bridge No. 39, also the approaches to Searles road bridge have been widened.

GLENS FALLS FEEDER — BRIDGES.

The berme abutment at Green's bridge should be rebuilt, the lower part being nothing more than the vertical wall of the prism, and is liable to bulge into the canal and damage the bridge.

The remainder of the bridges and abutments are in good condition.

CHAMPLAIN CANAL — PRISM AND BANKS.

The prism has been much improved in a few places and contemplated improvements under contract will add much to increasing the capacity of the same. The banks are in many places too low for the quantity of water they have to sustain and are higher on the outer than on the inner angles, thus allowing a great amount of material to wash into the prism. The bottom width of the canal could be increased in many places by dredging on the berme side. The docking is in very bad condition and cannot be renewed unless the walls are repaired and carried up high enough to support it.

The prism and banks on the Glens Falls feeder are in fair condition, except between Glens Falls and the guard lock. This part should be bottomed out and the ridges of rock on the bottom near the guard lock be removed.

CHAMPLAIN CANAL — BREAKS.

The only delay to navigation on this canal was on the sixteen mile level, caused by a break through the tow-path bank at Costello's grocery, at Coveville, three and one-half miles south of Schuylerville. This occurred on the morning of June 9th, causing a detention of two weeks, navigation not being resumed until June 23d. A section of the tow-path bank 100 feet long on the bottom, 170 feet long on top and twenty feet deep was carried into a branch of the river which extends to the foot of the slope. The prism and banks were badly damaged for a distance of 700 feet above and 1,000 feet below the break, twenty-five thousand cubic yards of material being carried into the river.

A strong timber crib, filled with stone, was constructed in the break about twelve feet back of the inner angle, sheet piled at the foot and lined on the face with matched plank and filled in front with puddled clay. The filling for the prism and bank was obtained near at hand. The bank as built has stood from that time with no slope wall protection and with no leakage under or through the crib.

This bank has always been unsafe, four serious breaks having occurred here before; the bottom is a quicksand forming a poor foundation. An appropriation has been made and contract let for strength-

ening this bank for its entire length by means of piles at the foot of the slope, driven close together and extending three feet out of the ground, to support the lower side of stone filling to weight the bank; this filling will average about two cubic yards to the running foot. I would recommend that a slope wall be put in the prism on the tow-path, to protect the bank from wash.

CHAMPLAIN CANAL—ORDINARY REPAIRS.

Some bottoming out has been done, also raising banks. Lock No. 9 was repointed and part of the face on the west side of the lock dressed off. The tow-path bank from lock 20 to Whitehall has been put in fair condition; more State scows should be furnished on this canal to boat the material needed for graveling the banks.

CHAMPLAIN CANAL—EXTRAORDINARY REPAIRS.

Under act, chapter 97, Laws of 1882, the sum of \$199,877.80, being the unexpended balance of the sum of \$500,000 appropriated by act, chapter 399, Laws of 1874, for the improvement of the Champlain canal, was reappropriated to be expended under the direction of the canal board for continuing the improvement of the Champlain canal and Glens Falls feeder; this unexpended balance with interest up to Oct. 1, 1883, amounted to \$201,283.66.

By resolutions of the canal board the following amounts have been set aside from the above unexpended balance to continue the improvement of the Champlain canal and Glens Falls feeder, necessary engineering expenses included in each piece of work.

No.	DESCRIPTION.	When appropriated by canal board.	Amounts.
1.	For widening and improving the Champlain canal south lock No. 5.	Dec. 28, '82.	\$1,536 98
2.	For widening and improving the Champlain canal in the village of Waterford between Broad and Division streets	Dec. 28, '82.	8,676 75
3.	Rebuilding waste-weir at Burton's mill, Waterford	Jan. 15, '84.	4,976 00
4.	Building spillway between locks 5 and 6.	Jan. 15, '84.	3,166 00
5.	Widening and deepening prism also building one new tow-path bridge abutment and one superstructure at Stillwater.....	Jan. 15, '84.	19,485 00
6.	Improving prism, including one bridge superstructure and its abutments at Coveville.....	Jan. 15, '84.	29,463 00
7.	Rebuilding waste-weir above lock 11.	Jan. 15, '84.	2,249 00
8.	Strengthening berme bank and rebuilding culvert 3-4 mile south of Fort Miller lock.....	Jan. 15, '84.	3,770 00

No.	DESCRIPTION.	When appropriated by canal board.	Amounts.
9.	Improving prism and banks 1-4 mile south of Moses Kill lock.....	Jan. 15, '84.	\$1,725 00
10.	Strengthening banks between Moses Kill lock and Moses Kill aqued't.	Jan. 15, '84.	650 00
11.	Strengthening berme bank 3-4 mile north of Moses Kill lock.....	Jan. 15, '84.	1,344 00
12.	Improving prism and banks at Woodchuck Point.....	Jan. 15, '84.	8,660 00
13.	Improving prism, including one bridge superstructure and one bridge abutment at foot of Glens Falls feeder.....	Jan. 15, '84.	2,252 00
14.	Building new tow-path and change bridge at lock 20.....	Jan. 15, '84.	5,912 00
15.	Rebuilding Eastman's waste-weir 2½ miles south of Whitehall.....	Jan. 15, '84.	5,084 00
16.	Improving prism, one mile south of Whitehall, including one bridge superstructure and one berme bridge abutment.....	Jan. 15, '84.	2,906 00
17.	Improving prism between bridges 139 and 140 near Whitehall.....	Jan. 15, '84.	11,900 00
18.	Building bridge and abutments, over escape to waste-weir No. 12.....	Jan. 15, '84.	343 00
19.	Improving prism at railroad bridge north of lock 20.....	Jan. 15, '84.	7,365 00
20.	Improving prism and building docking at Smith's Basin.....	Jan. 15, '84.	930 00
21.	Building four tow-path and three berme bridge abutments.....	Jan. 15, '84.	8,575 00
22.	Widening and improving the canal south of Fort Miller lock.....	Jan. 22, '84.	1,545 00
23.	Widening and improving the canal at bridge No. 95 (erroneously stated as bridge 94 in Canal Board proceedings).....	Jan. 22, '84.	470 00
24, 25, 26.	Strengthening the leaking banks of the Glens Falls feeder, between Greens bridge and Finch & Pruyns' mill at Glens Falls. Widening the upper end of lock No. 10, Glens Falls feeder. Widening and strengthening sluice at head of Fort Edward lock.....	Aug. 6, '84.	5,184 91
27.	Balance needed to finish the proposed improvement at Waterford (No. 2, of this list).....	Aug. 6, '84.	906 74
28.	Balance needed to finish proposed improvement, rebuilding Eastmans waste-weir (No. 15, of this list).....	Aug. 6, '84.	3,630 29

No.	DESCRIPTION.	When appropriated by Canal Board.	Amounts.
29.	Strengthening sloop lock at the Troy dam.....	Sept. 16, '84.	\$5,526 08
30.	Raising two tow-path abutments and approaches, also for rebuilding one tow-path abutment and approach, and for building two wooden bridges.....	Sept. 16, '84.	2,787 85
31.	Strengthening 7½ chains of berme bank at Mechanicville.....	Sept. 16, '84.	4,504 75
32.	Widening 11 chains of canal at Woodchuck Point.....	Sept. 16, '84.	2,597 95
33.	Improving 11 chains of canal between bridges 140 and 141, near Whitehall	Sept. 16, '84.	4,185 00
34.	Improving 18 chains of canal near the railroad bridge at Whitehall..	Sept. 16, '84.	12,192 00
35.	Rebuilding culvert and improving 3 chains of canal at Thorne's lane, above lock No. 6.....	Sept. 16, '84.	5,424 00
36.	Strengthening tow-path bank near Coveville.....	Sept. 16, '84.	6,689 20
37.	Improving 11½ chains of Glens Falls feeder at Finch & Pruyns Lime Kiln, Glens Falls.....	Sept. 16, '84.	6,019 50
38.	Rebuilding waste-weir near lock No. 20.....	Sept. 16, '84.	3,102 74
39.	Balance needed to complete proposed improvement of 18½ chains near Whitehall (No. 16 of this list)...	Sept. 16, '84.	190 41

Total amount appropriated.....	\$195,925 15
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From this total the amount appropriated by the Canal Board January 15, 1884, for the Woodchuck Point improvement (No. 12 of this list), is to be deducted ; the plan was changed and the amount stated in No. 32 was appropriated by the Canal Board at the meeting held September 16, 1884.....

	8,660 00
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Total amount appropriated for the thirty-nine items ; No. 12 omitted.....	\$187,265 15
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To the unexpended balance on hand October 1, 1883..	\$201,283 66
Add interest from October 1, 1883, to October 1, 1884.	5,712 61

Total available for improvements.....	\$206,996 27
Deduct amount appropriated as shown above.....	187,265 15

Total remaining available for further improvements..	\$19,731 12
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DESCRIPTION OF THE CHAMPLAIN CANAL IMPROVEMENTS.

1. This improvement is on the tow-path, beginning sixteen chains south of hollow quoin of lock No. 5, and runs south from this point six chains. The bend in the tow-path is straightened, the canal widened and new tow-path bank constructed, and six chains of slope wall built.

2. This improvement is on the berme side at Waterford, beginning just below the Broad street bridge and running to a point three chains above the Division street bridge. The canal to be widened, vertical wall in cement put in for the whole distance and to run in front of the abutments so as to give an unbroken passage for boatmen who wish to tie up, the Waterford weigh-lock being located just above the work. The berme abutment of the Division street bridge is to be set back and rebuilt so as to give a clear span of sixty-six feet, and a new superstructure to be built with a sixteen-foot roadway and five-foot sidewalk, also the berme approach to be raised.

3. Rebuilding Burton's waste-weir at Burtons mill, Waterford. This will be built on an improved plan having wrought-iron lift gates and a logway constructed, which will reduce the amount of water spilling over the same.

4. Building spillway between locks 5 and 6; to discharge the surplus water that accumulates on this level when the locks are operated and endangers the tow-path.

5. Improvement at Stillwater. Bends on the tow-path and berme to be straightened, and canal widened. The inside slope of the tow-path from Sta. 0 to Sta. 3, to be $1\frac{1}{4}$ slope protected with slope wall; from Sta. 3 to Sta. 4, with vertical wall in cement; from station 4 to station 22, the inner slope of tow-path to be 1 to 1 with vertical wall in cement placed on a bench five feet above canal bottom, with Norway pine coping timbers and oak ties on top of wall; from station 22 to 23, vertical wall in cement from canal bottom; station 23 to 28 with vertical wall on bench as described above, and from station 28 to 34 with slope wall same as described from station 0 to station 3. The berme side from station 3+60 to 9+60 to have vertical wall in cement and the rest of the distance will have no protection. This improvement includes the moving back and rebuilding the tow-path abutment, and constructing a new bridge of sixty-two-foot span and twelve foot clear roadway. Stations run north; Sta. 0 is centre of culvert.

6. Improvement at Coveville. Sta. 0 is center of culvert; stations runs north. Tow-path bends straightened and canal widened on berme side from Sta. 0 to Sta. 18. A new piece of canal is to be constructed from Sta. 21 to Sta. 26. From Sta. 26 to Sta. 54, bends on tow-path and berme to be straightened. From Sta. 1+50 to Sta. 21, inside slope of tow-path to be one and one-fourth to one, protected with slope wall. From Sta. 21 to Sta. 26, inside slope of tow-path to be one to one, with a vertical wall in cement placed on a bench five feet above canal bottom, with Norway pine coping timbers on top of same. From Sta. 26 to Sta. 54, slope wall as described above. The berme side will need only two chains of protection wall to be used near the culvert.

7. Rebuilding waste-weir above lock No. 11. The work is on the tow-path side and consists of rebuilding an abandoned waste-weir with a structure on an improved plan, having improved wrought-iron lift gates.

8. Rebuilding culvert and strengthening bank, three-fourths of a mile south of Fort Miller. A stone diving culvert to be constructed and twelve chains of berme bank to be strengthened by embankment.

9. Improvement one-fourth mile south of Moses Kill lock. Widening canal by excavating six chains of rock on the berme side.

10. Improvement between Moses Kill lock and Moses Kill aqueduct. Strengthening six chains of tow-path and berme banks with embankment.

11. Improvement three-fourths of a mile north of Moses Kill lock. This improvement is on the berme side and consists of strengthening eight chains of berme bank with embankment, and raising and lengthening parapet of culvert to hold the embankment.

12. This improvement is the original plan which has since been changed, vide No. 32 of this list.

13. At the foot of the Glens Falls feeder. This work is on the berme side and consists in widening three and one-half chains of the prism by excavating from the line of the feeder docking, north; also, to set back and rebuild the berme abutment, and construct a new road, and change bridge of eighty feet clear span.

14. Work on north side of lock 20. This work consists of changing ten chains of the present tow-path between lock 20 and present change bridge, from the west to the east side of the canal; also, changing present location of change bridge from a point eleven chains north of lock to a point about one chain north of lock, by constructing a new tow-path and berme abutment, and new superstructure for the change bridge at this point, and changing the present change bridge to a road bridge by constructing a new tow-path abutment and new superstructure. Some excavation is to be done on the tow-path, 210 feet of vertical wall in cement and sixty-six feet of slope wall to be constructed, connecting with the wall on the north side of the present bridge.

15. Rebuilding Eastman's waste-weir near Whitehall. This consists of rebuilding the waste-weir on an improved and enlarged plan with wrought iron lift gates and increased length of spillway.

16. Improving prism one mile south of Whitehall, widening thirteen and one-half chains of canal on berme side, and building berme abutment and new superstructure.

17. Improvement between bridges 139 and 140 at Whitehall. This consists of widening and straightening canal, and protecting the tow-path with slope wall from Sta. 0 to Sta. 41. No protection on the berme. Station 0 is just north of bridge 139.

18. Building bridge and abutments over escape to waste-weir No. 12. The highway crosses this stream and new abutments and superstructure are to replace the old ones.

19. Improving prism at R. R. bridge, north of lock 20. The canal is to be widened and straightened on tow-path, and berme sides from Sta. 0 to Sta. 11. Station 0 is four chains south of farm bridge. From Sta. 0 to Sta. 3 is to be protected by slope wall, and from Sta. 3 to Sta. 11 by vertical wall in cement. Berme has no protection.

20. Improving prism and building docking at Smith's basin. This improvement is on the berme side and consists of improving 262 feet of prism and banks from the bridge south.

21. Constructing seven bridge abutments. This work consists of tearing down and rebuilding the following abutments: One tow-path abutment at Division street, Waterford; one tow-path abutment at second bridge north of lock No. 6; one tow-path and one berme abutment at second bridge south of lock No. 9; one berme abutment at first bridge north of Stillwater; one tow-path abutment at first bridge north of lock 14; one berme abutment at bridge 96, four miles south of Fort Edward.

22. Improvement south of Fort Miller lock. Six chains of canal is to be widened on the berme side, which widening consists of earth and rock excavation. Station 0=100 feet south of lower hollow quoin of lock No. 13.

23. Improvement at bridge No. 95. This consists of cutting off the rock projection in front of the berme abutment. This abutment was rebuilt and set back, and the rock was not excavated.

24. Strengthening leaking banks on the Glens Falls feeder, between Greene's bridge and Finch and Pruyn's mill. This work consists of repairing and pointing up vertical wall on both sides of the canal.

25. Rebuilding and widening the upper end of lock No. 10 on the Glens Falls feeder. This work consists of rebuilding the head of the lock on the enlargement plan.

26. Widening and straightening the sluices at the head of Fort Edward lock No. 15.

27. Additional appropriation for the completion of the Waterford work, No. 2 of this list.

28. Additional appropriation for the completion of Eastman's waste-weir, No. 15 of this list.

No. 29. Improvement at Sloop Lock pier, Troy dam. This work consists of building a timber crib filled with stone from the crest of the dam, south and east to the sloop lock; the crib to be built on the west side of old pier and at the elevation of the dam to lap over about eight feet on the pier of the lock.

30. Raising abutments and approaches, and rebuilding one tow-path abutment and two superstructures. This work consists of raising the abutments and approaches on the tow-path at first bridge north of Stillwater and at bridge No. 96, so as to give a clearance over the water of eleven feet for the bridge, setting back and rebuilding the tow-path abutment at the bridge at the mouth of the Glens Falls feeder, and building new superstructures for first bridge north of lock 14 and bridge No. 96.

31. Strengthening seven and one-third chains of the berme bank at Mechanicville. This work consists of rebuilding vertical wall in cement from the William street bridge south seven and one-third chains; also strengthening the berme bank with embankment, and protecting it at the foot of the bank at the culvert by means of a retaining wall about forty feet long. The waste-gate of the Hosiery Mill dam discharges directly opposite this bank and washes it away, and the wall is built to prevent this.

32. Improvement at Woodchuck Point. This work is according to

change of plan, and consists of widening the prism of the canal on tow-path and berme sides. From Station 0 to Station 4 the prism is to be widened on the berme, with no protection. From Station 4 to Station 11 the prism is to be widened on the tow-path side with a slope wall protection.

33. Improving eleven chains of canal between bridges 140 and 141. This work begins at a point eighty links north of bridge No. 140. Station 0 is Station 40+80 of No. 17 of this list, and is a continuation of No. 17 between bridges 139 and 140. This work is on both sides of the canal, the same being widened and straightened. On the tow-path from Station 0 to Station 8+50 a slope wall one and a quarter to one is to be built; from Station 8+50 to Station 10+50 a vertical wall in cement, and from Station 10+50 to 11 a twist wall connecting with old slope wall. The berme side to have no protection.

34. Improving eighteen chains of canal at the railroad bridge at Whitehall. This work is all on the tow-path, and begins at a point 4.38 chains south of the railroad bridge. From Station 0 to Station 18 the tow-path is to be straightened and protected by a vertical wall in cement. No protection on the berme.

35. Rebuilding culvert and improving three chains of canal at Thorné's lane, above Lock 6. This work consists of straightening three chains of tow-path, building a stone box diving culvert 3 + 4 feet, opening at right angles to the new inner angle and a short distance above the old structure; also building a new tow-path bank and straightening and deepening the ditch on the tow-path side.

36. Improvement at Coveville. This work consists of strengthening the bank by means of piles about twenty feet long driven close together at the foot of the slope and projecting when driven three feet above the surface of ground, and supporting one side of a pile of loose stone placed there to weight the bank; the content of this stone pile will be two cubic yards per running foot. Station 0 is 1.66 chains south of south end of crib built in repairing break of 1884, and runs as follows: Station 0 to Station 1+66; Station 3+30 to Station 5+30; Station 6 to Station 13+50; Station 14+30 to Station 17; making 13.86 chains, or 915 feet.

37. Improving eleven and one-half chains of the Glens Falls feeder at Finch & Pruyn's lime kiln, Glens Falls. The work to be done on the following plan: Commencing on the berme side about the center of Finch & Pruyn's warehouse, running thence west for a distance of about eleven and one-half chains to a projection in the vertical wall now standing. The old wall to be taken down and new vertical wall in cement built on a line about seven feet back of present wall, increasing the width of the prism.

38. Rebuilding waste-weir near Lock 20. The old foundation is to be repaired and used to support a structure with a spillway of eighty-four feet, having two waste gates two feet two inches by four feet. The plan of this work was designed to give sufficient strength to the structure to resist the action of ice and water in time of freshets; the masonry is to be clamped and bolted to make it strong and durable.

39. Balance needed to complete the work one mile south of Whitehall. No. 16 of this list.

Of the above pieces of work Nos. 3, 4, 5, 6, 7, 8, 13, 16, 17, 19, 21,

35, 36 and 38 are let and under contract; the balance will be done by the Superintendent of Public Works.

Of the above pieces of work done by the Superintendent of Public Works, Nos. 2, 10, 11, 15, 18, 20, 24, 25 and 29 are completed.

Of the above pieces of work under contract the following are now in progress of construction, and estimates for the accompanying amounts have been paid up to and including September 30, 1884 :

No. 3.	For material delivered only; 15 per cent deducted.	\$259 00
No. 5.	Fifteen per cent deducted.....	2,575 00
No. 6.	“ “ “	2,139 00
No. 8.	“ “ “	1,503 00
No. 16.	“ “ “	2,281 00
No. 17.	“ “ “	510 00
No. 19.	“ “ “	1,210 00
No. 21.	“ “ “	4,066 00

I would respectfully recommend that the following improvements be made, and the amounts set opposite each be appropriated by the Canal Board therefor, engineering expenses included in all estimates:

1. Between Lock 8 and the waste-weir on the berme side.
This improvement consists of strengthening the bank by means of sixty-six feet of vertical wall in cement, and by embankment between the head of the lock and the waste-weir.

Estimated cost..... \$663 71
2. Two and one-half chains north of Wilbur's Basin waste-weir.
This improvement is on the tow-path side and runs from a point two chains fifty links north from the center of Wilbur's Basin waste-weir to a point nine and one-half chains north of the same, and consists of strengthening the bank by means of embankment.

Estimated cost..... 535 81
3. Between bridges Nos. 79 and 80.
This work is on the tow-path side and begins 11.36 chains north of the center of bridge No. 79 and ends at a point 4.82 chains south of bridge No. 80. This improvement consists of strengthening fifteen chains of bank with embankment.

Estimated cost..... 750 96
4. Between bridges Nos. 93 and 94, over culvert No. 14.
This improvement is on the berme side and consists of strengthening by embankment six chains of the bank. Station 2 + 60 is the center of culvert; stations run north.

Estimated cost..... 282 35
5. At Launder's culvert No. 15.
This improvement is on both sides of the canal. Station 6 + 21 is center of the culvert; stations run north.

consists of lengthening the berme end of the culvert thirteen feet and strengthening the berme bank by embankment from Station 3+33 to Station 8+33 and building slope wall from Station 4 to Station 8+33.

The tow-path to be strengthened by embankment from Station 1 to Station 11+50, from station 4 to Station 8+33, with vertical wall in cement; prism to have a width on bottom of forty-four feet.

Estimated cost..... \$4,813 77

6. Between bridges Nos. 102 and 103.

This improvement is on the tow-path and begins at Station 0—40, six chains north of center of bridge No. 102, and runs thence northerly for a distance of 8.40 chains. The bank to be strengthened by embankment for the whole distance.

Estimated cost..... 601 33

7. Empie's waste weir No. 17, two and one-half miles south of Fort Ann.

This improvement is on the tow-path and consists of rebuilding the waste weir on an improved plan with wrought iron lift-gates.

Estimated cost..... 3,373 72

8. Between Broad and Division streets, Waterford.

This improvement is on the berme side and begins at the north end of the Broad street bridge and runs northerly about 250 feet, consisting of protecting the slope of the berme bank above the water level so as to give a six-foot passageway, by means of a slope wall on a batter of one-half to one, starting at C. B. +5.0, and the height to vary with the height of the old surface of ground; part of this wall to be laid in cement and part laid dry.

Estimated cost..... 627 09

Total..... \$11,648 74

This amount, \$11,648.74 deducted from \$19,731.12 leaves \$8,032.38, available for further improvements under the heading of extraordinary repairs.

By act, chapter 154 Laws of 1884, the Legislature appropriated the sum of \$6,000 for the construction of an iron highway bridge over the Champlain canal in the town of Watervliet in the county of Albany. This work has been let by contract, and work on the same will begin the coming month.

ENGINEERING DEPARTMENT.

This division has for the past fiscal year been in charge of Charles A. Beach, division engineer from October 1, 1883, to January 2, 1884, and H. C. Parsons, resident engineer from October 1, 1883, to November 12, 1883; R. M. Hasbrouck, division engineer from January 4, to August

1, 1884; John R. Kaley, acting division engineer from August 1, to August 9, 1884, and John R. Kaley, division engineer from August 9, to October 1, 1884.

The work of the department has been attending to the general routine of office work, making surveys, plans and estimates for the various pieces of work mentioned in this report, where appropriations have been made and are recommended to be made for performing the same, amounting to more than forty pieces in all; locating, measuring and making report of the encroachments on the blue line of the Erie and Champlain canals; staking out and attending to the construction of bridges and abutments on the Erie canal; making surveys and plans for gravel pits on the Champlain canal and Glens Falls feeder. Locating, making plans and estimates for fishways in the dams on the Hudson river from Albany to Glens Falls; making surveys and plans for the Board of Claims, for property claimed to be damaged by leakage from the Erie canal at Port Schuyler and West Troy; also surveys, maps and estimates for claims for damages arising from the repairs to the Coveville break; staking out, superintending the construction and making monthly estimates of the work now under contract and of that being done by the Superintendent of Public Works. Establishing a line of much needed benches on the Champlain canal between Locks Nos. 8 and 9, Nos. 9 and 10 and Nos. 20 and 21; attending to the rebuilding and enlarging the upper end of Lock No. 10 on the Glens Falls feeder; building vertical wall in cement on the tow-path at Port Jackson and on the berme at Lock No. 30, Erie canal. A statement of the engineering expenses for this division is annexed, showing in detail the names of persons employed, time of service and compensation.

Statement showing names, rank, number of days and compensation of engineers employed on the eastern division of the New York State canals, together with incidental expenses during the fiscal year ending September 30, 1884.

ORDINARY REPAIRS — ERIE CANAL.

Chas. A. Beach, division engineer, salary \$2,400..	\$408	76
Chas. A. Beach, division engineer, travel	88	64
R. M. Hasbrouck, division engineer, salary \$2,400	918	78
R. M. Hasbrouck, division engineer, travel	13	56
John R. Kaley, division engineer, salary, \$2,400.	234	15
John R. Kaley, division engineer, travel	4	13
Henry C. Parsons, resident engineer, salary \$2,000	157	08
John R. Kaley, assistant engineer, 188 days at \$5 per day	940	00
John R. Kaley, assistant engineer, travel	140	06
Geo. I. Bailey, rodman, 289 days at \$3.50 per day.	1,011	50
Geo. I. Bailey, rodman, travel	122	57
F. W. Hodgman, rodman, 43 days at \$3.50 per day.	150	50
F. W. Hodgman, rodman, travel	18	12
Martin Schenck, rodman, 26 days at \$3.50 per day.	91	00
Martin Schenck, rodman, travel	21	11
Chas. H. Whitbeck, chainman, 230 days at \$2.50 per day	575	00

Chas. H. Whitbeck, chainman, travel.....	\$29 25	
John Donlan, chainman, 79 days at \$2.50 per day.	197 50	
		<u>\$5,121 71</u>

INCIDENTALS.

Fuel.....	\$14 75	
Light.....	5 25	
Office rent	175 00	
Postage, telegraph and telephone	124 09	
Stationery.....	120 50	
Labor.....	98 00	
Miscellaneous	166 09	
		<u>703 68</u>
		<u><u>\$5,825 29</u></u>

ORDINARY REPAIRS — CHAMPLAIN CANAL.

Chas. A. Beach, division engineer, salary \$2,400.	\$204 38	
Chas. A. Beach, division engineer, travel.....	48 50	
R. M. Hasbrouck, division engineer, salary \$2,400	459 38	
R. M. Hasbrouck, division engineer, travel.....	20 65	
John R. Kaley, division engineer, salary \$2,400..	117 08	
John R. Kaley, division engineer, travel	27 36	
Henry C. Parsons, resident engineer, salary \$2,000	78 54	
Henry C. Parsons, resident engineer, travel	27 15	
		<u>\$983 04</u>
Total for Erie		5,825 39
		<u><u>\$6,808 43</u></u>

EXTRAORDINARY REPAIRS — CHAMPLAIN CANAL.

Denison Richmond, engineer in charge, 36 days at \$6 per day.....	\$216 00	
Denison Richmond, engineer in charge, travel...	38 68	
C. L. Johnson, assistant engineer, 194 days at \$5 per day.....	970 00	
C. L. Johnson, assistant engineer, travel.....	266 31	
R. A. Hartwell, assistant engineer, 40 days at \$5 per day.....	200 00	
R. A. Hartwell, assistant engineer, travel.....	27 53	
G. V. Rapp, assistant engineer, 26 days at \$5 per day.	130 00	
G. V. Rapp, assistant engineer, travel.....	56 03	
G. V. Rapp, leveller, 159 days at \$4.50 per day..	715 50	
G. V. Rapp, leveller, travel.....	85 85	
C. G. Douw, leveller, 96 days at \$4.50 per day...	432 00	
C. G. Douw, leveller, travel.....	45 53	
R. E. Morris, leveller, 127 days at \$4.50 per day.	571 50	

R. E. Morris, leveller, travel.....	\$117 49	
Geo. I. Bailey, leveller, 26 days at \$4.50 per day..	117 00	
Geo. I. Bailey, leveller, travel.....	1 05	
C. R. Baldwin, rodman, 194 days at \$3.50 per day.	679 00	
C. R. Baldwin, rodman, travel.....	85 75	
C. H. Barber, rodman, 185 days at \$3.50 per day.	647 50	
C. H. Barber, rodman, travel.....	44 50	
Thos. Murphy, rodman, 54 days at \$3.50 per day.	189 00	
Thos. Foley, rodman, 35 days at \$3.50 per day...	122 50	
Martin Schenck, rodman, 60 days at \$3.50 per day.	210 00	
Martin Schenck, rodman, travel.....	9 01	
Fred. W. Hodgman, rodman, 40 days at \$3.50 per day.....	140 00	
Fred. W. Hodgman, rodman, travel.....	31 96	
F. D. Lamouree, rodman, 40 days at \$3.50 per day.	140 00	
F. D. Lamouree, rodman, travel.....	31 11	
F. D. Lamouree, chainman, 145 days at \$2.50 per day.....	362 50	
F. D. Lamouree, chainman, travel.....	34 43	
Jno. T. Slattery, chainman, 61 days at \$2.50 per day.....	152 50	
Jno. T. Slattery, chainman, travel.....	30 75	
John McElroy, chainman, 30 days at \$2.50 per day.	70 00	
John McElroy, chainman, travel.....	25 13	
	<hr/>	7,001 17

INCIDENTALS.

Stationery.....	\$174 50	
Office rent.....	32 60	
Postage and telegraph.....	36 40	
Miscellaneous.....	311 00	
	<hr/>	554 50
Total.....		<hr/> <hr/> \$7,555 67

The above table is summarized as follows:

Expended for ordinary repairs from October 1, 1883, to October 1, 1884, Erie canal	\$5,121 71
Expended for ordinary repairs from October 1, 1883, to October 1, 1884, Champlain canal.....	983 04
Expended for incidentals, ordinary repairs, Erie and Champlain canals.....	703 68
Expended for extraordinary repairs from October 1, 1883, to October 1, 1884, Champlain canal.. ...	7,001 17
Expended for incidentals, extraordinary repairs form October 1, 1883, to October 1, 1884, Champlain canal.....	554 50
Total	<hr/> <hr/> \$14,364 10

LIST OF BENCHES FROM LOCK NO. 8 TO NO. 9, CHAMPLAIN CANAL.

Description.	Elevation above C. B.	Elevation above T. W.
Lower mitre-sill, lock No. 8.....	+0.000	+74.669
S. E. Hollow Quoin, lock No. 8.....	<div> <div>lower level.</div> <div>+19.975</div> <div>upper level.</div> <div>+8.880</div> </div>	+94.644
Lower step, S. W. corner, tow-path abutment bridge No. 23.....	8.964	94.728
Lower step, S. W. corner, tow-path abutment bridge No. 24.....	10.865	96.629
Lower step, N. W. corner, tow-path abutment bridge No. 26.....	8.285	94.049
S. E. corner Hosiery mill, Mechanicville (water table)	10.351	96.115
Lower step, N. W. corner, tow-path abutment bridge No. 29.....	10.634	96.398
S. E. corner, north abutment waste-weir No. 3.	7.753	93.517
Lower step, N. E. corner, berme abutment bridge No. 30.....	10.440	96.204
Lower step, S. E. corner, abutment on tow- path of B., H. T. & W. R. R. bridge.....	7.743	93.507
Mitre-sill, lock No. 9.....	0.000	85.764

LIST OF BENCHES ON 16 MILE LEVEL — CHAMPLAIN CANAL.

Established by C. L. Johnson, Assistant Engineer, between locks No.
9 and No. 10, May, 1884.

Description.	Elevation above C. B.	Elevation above T. W.
Lower mitre-sill, lock No. 9 (starting point).	+0.000	+85.764
S. E. gate anchor, lock No. 9.....	<div> <div>lower level.</div> <div>+17.073</div> <div>upper level.</div> <div>+8.776</div> </div>	+102.837
S. E. corner, lower step, berme abutment bridge No. 32.....	12.691	106.752
Water line, berme abutment bridge No. 32..	7.299	101.360
N. E. corner, lower step, berme abutment bridge No. 33	8.642	102.703
S. E. corner, 3d step from top, berme abut- ment bridge No. 34	14.976	109.037
Lansing's waste-wier coping, S. end, east stone	9.213	103.274
Lansing's waste-weir coping, N. end, east stone.....	9.011	103.072
S. W. corner, lower step, tow-path abutment bridge No. 38	9.765	103.826
Second course, third stone from S. end, tow- path abutment Stratton's bridge No. 39..	9.579	103.640
N. E. corner, lower step, berme abutment Baker's bridge No. 42.....	11.912	105.973

Description.	Elevation above C. B.	Elevation above T. W.
S. E. corner, middle abutment, Bemis Hights waste-weir.....	+9.934	+103.995
N. E. corner, second step from bottom, berme abutment Cheever's bridge No. 46	10.947	105.008
N. E. corner coping, S. end, Wilbur's waste-weir.....	8.473	102.534
S. E. corner coping, N. end, waste-weir No. 7.	9.807	103.868
N. E. corner, second step from bottom, berme abutment Holmes' bridge No. 59	13.032	107.093
N. E. corner coping, S. end Coveville waste-weir.....	9.140	103.201
Point on stone, second course, S. end, tow-path abutment Wilcox bridge No. 62.....	11.047	105.108
Elm tree, 150 feet S. of Cramer's bridge No. 63, tow-path side... ..	9.113	103.174
Ash tree, near Sta. 43 (Coveville Improvement Survey).....	10.031	104.092
N. W. corner, lower step, tow-path abutment Slade's bridge No. 64.....	13.760	107.821
Point on second stone from S. end, tow-path abutment Cramer's bridge No. 65.....	9.773	103.834
Top of spillway, Fish Creek Aqueduct (East side).....	7.962	102.023
Bottom of Fish Creek Aqueduct.....	-0.158	93.903
Second step from bottom N. W. wing wall, tow-path abutment Ferry St. (Schuylerville), bridge No. 68.....	+12.648	106.709
S. W. corner, lower step, tow-path abutment Saratoga St. (Schuylerville), bridge No. 69.	12.468	106.529
N. W. corner, second step from bottom, tow-path abutment Bullard's bridge No. 70...	13.656	107.717
Mitre-sill, lock No. 10.....	0.000	94.061
Elevation of mitre-sill, lock No. 10.	94.061	
Elevation of lower mitre-sill, lock No. 9.....	85.764	
Lift of lock No. 9.....	8.297	

BENCH MARKS ON WHITEHALL LEVEL, BETWEEN LOCKS NOS. 20 AND 21.

Description.	Elevation above C. B.	Elevation above T. W.
On coping N. E. gate, anchor lock No. 20.	<div>+12.987 upper level. +13.025 lower level.</div>	+128.235
Berme abutment, north end, N. E. corner 4th course down, bridge No. 135.....	+13.150	128.360
Berme abutment, north end, N. E. corner 6th course down, bridge No. 136.....	10.617	125.827

Description.	Elevation above C. B.	Elevation above T. W.
Berme abutment, south end, S. E. corner 5th course down, bridge No. 137.....	+11.625	+126.835
Berme abutment, south end, S. E. corner 6th course down, bridge No. 138.....	11.083	126.293
Tow-path abutment, north end, N. W. corner 7th course down, bridge No. 139.....	10.316	125.526
Tow-path bent, north end, N. W. corner bridge No. 140.....	8.108	123.318
Tow-path abutment, north end, N. W. corner 6th course down, bridge No. 141.....	12.341	127.551
Tow-path abutment, north end, N. W. corner 8th course down, bridge No. 142.....	9.221	124.431
Berme abutment, north end, N. E. corner 4th course down, bridge No. 143.....	11.346	126.556
Berme abutment, south end, S. E. corner 5th course down, bridge No. 144.....	10.348	125.558
Tow-path bent, north end, N. W. corner, bridge No. 145.....	8.979	124.189
Tow-path abutment, north end, N. W. corner 7th course down, bridge No. 146.....	9.155	124.365
North end of wing, north end corner lower course, R. R. bridge.....	8.899	124.109
Tow-path abutment, north end, N. W. corner 6th course down, bridge No. 147.....	10.155	125.365
Tow-path bent, north end, N. W. corner, foot bridge.....	8.395	123.605
Tow-path abutment, south end, S. W. corner lowest course, iron R. R. bridge.....	10.658	125.868
Tow-path abutment, north end, N. W. corner 7th course down, R. R. bridge No. 148...	11.061	126.271
Tow-path bent, north end, N. W. horse bldg.	9.034	124.244
On coping N.E.E. gate, anchor lock No. 21.	7.600	122.810

All benches marked thus, ⊗.

EASTERN DIVISION — ERIE CANAL.

List of benches showing elevation canal bottom and above tide-water. T. W. = mean low tide, as determined by Captain Willard, U. S. Engineers Corps.

No.	Description.	Elevation above C. B.	Elevation above T. W.
1.	On shelf at lower end of pier, between locks at lock 1, marked ⊗, with chisel.	.....	+9.486
2.	Lower miter-sill, lock No. 1.....	+0.000	-7.443
3.	The coping of weigh lock.....	9.55	.....
4.	At station 53½, on tow-path abutment, Ferry street bridge on the north stone lower course, marked O, with chisel..	9.524	17.240
5.	At station 82¾, on tow-path tower of Sus- pension foot bridge, on projection of south cross-sill, marked ⊗ with knife.	10.426	18.142

No.	Description.	Elevation above C. B.	Elevation above T. W.
6.	Lower mitre-sill, lock No. 2 (at heel of S. W. gate, W. lock).....	+0.000	+7.716
7.	At station 0, on coping of lock No. 2, between ends of anchor of S. W. gate of W. lock marked ⊗ — B. M. with chisel.....	<div><div>18.000</div><div>lower level.</div><div>+8.505</div><div>upper level.</div></div>	25.716
8.	At station 39 on N., and tow-path parapet of culvert, marked ⊗ — B. M. with chisel.....	+7.226	24.437
9.	At station 97½ on N., and tow-path parapet of culvert, marked ⊗ — B. M. with chisel.....	7.923	25.134
10.	At station 156 on S. E. corner of coping on retaining wall of bridge approach, marked ⊗, with chisel.....	10.353	27.564
11.	At station 166, on N. E. corner tow-path, parapet of culvert, marked ⊗, with chisel.....	8.486	25.697
12.	At station 189, on coping of retaining wall at S. end of tow-path parapet of culvert, marked ⊗ — B. M. with chisel.	8.066	25.277
13.	At station 217, on N. end of retaining wall to bridge approach, N. E. corner of coping, marked ⊗ — B. M. with chisel.....	10.406	27.417
14.	At station 243¾, N. E. corner N. wing of tow-path abutment on coping marked ⊗ and on face of coping B. M. with chisel.....	14.574	31.785
15.	At station 269, on coping of lock on “lower side cut,” at anchor of N. W. gate, marked ⊗ — B. M. with chisel...	8.584	25.795
16.	At station 290, on tow-path abutment of Arsenal bridge at N. angle of main wall, top of lower course, marked ⊗ and (above) B. M. with chisel.....	11.566	28.777
17.	At station 320, on tow-path abutment of Ferry street bridge, S. E. corner of lower step of wing, marked ⊗ with chisel and (on face of stone) B. M....	11.563	28.774
18.	At station 365, on coping of N. wall, north lock of upper side cut, N. W. corner of W. stone, marked ⊗ — B. M. with chisel.....	9.257	26.468
19.	At station 398½, on N. E. corner tow-path parapet of culvert, marked ⊗ — B. M. with chisel.....	9.480	25.691
20.	Lower mitre-sill of Lock No. 3, at heel of S. W. gate of W. lock.....	0.000	17.211

No.	Description.	Elevation above C. B.	Elevation above T. W.
21.	On coping of lock No. 3, between ends of anchor S. W. gate of W. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} +20.260 \\ \text{lower level.} \\ +9.091 \\ \text{upper level.} \end{array} \right\}$	+37.471
22.	Lower mitre-sill of lock 4 (at heel of S. W. gate, W. lock).....	+0.000	28.380
23.	On coping of lock No. 4, between ends of anchor, S. W. gate, W. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 20.220 \\ \text{lower level.} \\ +8.840 \\ \text{upper level.} \end{array} \right\}$	48.600
24.	Lower mitre-sill, lock No. 5, at heel of S. E. gate, E. lock.	+0.000	39.760
25.	On coping of lock No. 5, between ends of anchor S. E. gate, E. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 19.630 \\ \text{lower level.} \\ +9.033 \\ \text{upper level.} \end{array} \right\}$	59.390
26.	Lower mitre-sill, lock No. 6, at heel of S. W. gate of W. lock	+0.000	50.357
27.	On coping of lock No. 6, between ends of anchor S. W. gate, W. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 19.000 \\ \text{lower level.} \\ +8.927 \\ \text{upper level.} \end{array} \right\}$	69.357
28.	Lower mitre-sill of lock No. 7, at heel of S. E. gate, E. lock.....	+0.000	60.430
29.	On coping, lock No. 7, between ends anchor, S. E. gate, E. lock, marked ⊗—B. M. with chisel ...	$\left. \begin{array}{l} 18.580 \\ \text{lower level.} \\ +8.649 \\ \text{upper level.} \end{array} \right\}$	79.010
30.	Lower mitre-sill, lock No. 8, at heel of S. W. gate, W. lock	+0.000	70.361
31.	On coping, lock No. 8, between ends of anchor, S. W. gate, W. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 18.885 \\ \text{lower level.} \\ +8.340 \\ \text{upper level.} \end{array} \right\}$	89.246
32.	Lower mitre-sill, lock No. 9, at heel of S. E. gate, E. lock	+0.000	80.906
33.	On coping, lock No. 9, between ends of anchor, S. E. gate, E. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 18.500 \\ \text{lower level.} \\ +9.092 \\ \text{upper level.} \end{array} \right\}$	99.406
34.	Lower mitre-sill, lock No. 10, at heel of S. W. gate, W. lock	+0.000	90.314
35.	On coping, lock No. 10, between ends of anchor, S. W. gate, lock W., marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 19.000 \\ \text{lower level.} \\ +8.638 \\ \text{upper level.} \end{array} \right\}$	109.314
36.	Lower mitre-sill, lock No. 11, at heel of S. W. gate, W. lock.....	+0.000	100.676
37.	On coping, lock No. 11, between ends of anchor, S. W. gate, W. lock, marked ⊗—B. M. with chisel.....	$\left. \begin{array}{l} 18.650 \\ \text{lower level.} \\ +9.029 \\ \text{upper level.} \end{array} \right\}$	119.326

No.	Description.	Elevation above C. B.	Elevation above T. W.
38.	Lower mitre-sill, lock No. 12, at heel of S. W. gate, W. lock.....	+0.000	+110.297
39.	On coping, lock No. 12, between ends of anchor, S. W. gate, W. lock, marked ⊗—B. M. with chisel.....	<div> <div>19.090</div> <div>lower level.</div> <div>+9.194</div> <div>upper level.</div> </div>	129.387
40.	Lower mitre-sill, lock No. 13, at heel of S. E. gate, E. lock.....	+ 0.000	120.193.
41.	On coping, lock No. 13, between ends of anchor, S. E. gate, E. lock, marked ⊗—B. M. with chisel.....	<div> <div>19.100</div> <div>lower level.</div> <div>+8.745</div> <div>upper level.</div> </div>	133.293
42.	Lower mitre-sill, lock No. 14, at heel of S. E. gate, E. lock.....	+0.000	130.548
43.	On coping, lock No. 14, between ends of anchor, S. E. gate, E. lock, marked ⊗—B. M. with chisel.....	<div> <div>18.700</div> <div>lower level.</div> <div>+8.668</div> <div>upper level.</div> </div>	149.248
44.	Lower mitre-sill, lock No. 15, at heel of S. E. gate, E. lock.....	+0.000	140.580
45.	On coping, lock No. 15, between ends of anchor, S. E. gate, E. lock, marked ⊗—B. M. with chisel.....	<div> <div>18.800</div> <div>lower level.</div> <div>+8.967</div> <div>upper level.</div> </div>	159.380
46.	Lower mitre-sill, lock No. 16, at heel of S. E. gate, E. lock.....	+0.000	150.413
47.	On coping, lock No. 16, between ends of anchor, S. E. gate, E. lock, marked ⊗—B. M. with chisel.....	<div> <div>18.920</div> <div>lower level.</div> <div>+8.875</div> <div>upper level.</div> </div>	169.333
48.	Lower mitre-sill, lock No. 17, at heel of S. W. gate, W. lock.....	+0.000	160.458
49.	On coping, lock No. 17, between ends of anchor, S. W. gate, W. lock, marked ⊗—B. M. with chisel.....	<div> <div>19.020</div> <div>lower level.</div> <div>+8.733</div> <div>upper level.</div> </div>	179.478
50.	Lower mitre-sill, lock No. 18, at heel of S. W. gate, W. lock.....	+0.000	170.745
51.	On coping, lock No. 18, between ends of anchor, S. W. gate, W. lock, marked ⊗—B. M. with chisel.	<div> <div>19.040</div> <div>lower level.</div> <div>+8.791</div> <div>upper level.</div> </div>	189.785
52.	At station 18 1-4, on coping of south abutment of waste-weir on tow-path, marked ⊗—B. M. with chisel.....	9.035	190.029
53.	At station 57 1-2, on N. end, berme abut- ment (wing) of bridge, marked ⊗—B. M. with chisel.....	10.156	191.150
54.	At station 128 1-2, S. E. corner coping, N. wing berme abutment of farm bridge, marked ⊗—B. M. with chisel.	15.526	196.520

No.	Description.	Elevation above C. B.	Elevation above T. W.
55.	At station 129 1-2, on N. end tow-path abutment of farm bridge, on projection of fifth stone from top at N. end of wing, marked ⊗ and on stone above, B. M. with chisel.....	+12.024	+193.018
57.	At station 168 3-4, on top of coping of S. wing, at end tow-path abutment of farm bridge, marked ⊗—B. M. with chisel.....	11.143	192.137
58.	At station 169 1-4, on top of coping of N. wing, at end berme abutment of farm bridge, marked ⊗—B. M. with chisel.....	11.461	192.455
59.	At station 220 1-4, on top of coping, S. W. corner S. E. wing of aqueduct, marked ⊗—B. M. with chisel.....	13.308	194.302
60.	At station 238, on top of coping, N. W. corner N. W. wing of aqueduct, marked ⊗—B. M. with chisel.....	13.189	194.183
61.	At station 340, on projection on face of first stone under coping, east wing tow-path abutment, marked ⊗—B. M. with a chisel.....	11.552	192.546
62.	At station 340, at centre of tow-path abutment on face of sixth course under coping, marked B. M.—⊗ with chisel.	10.176	191.170
64.	At station 432 1-2, on projection on sixth course below coping, near centre tow-path abutment, marked B. M.—⊗ with chisel.....	9.949	190.943
65.	At station 461, on rock at rear of tow-path, marked ⊗—B. M.....	11.158	192.152
66.	At station 512 1-4, on projection on sixth course below coping, near W. angle face of tow-path abutment (Clute's), road bridge, marked ⊗—B. M. with chisel.....	11.079	192.073
67.	At station 521 1-2, of face of E. wing tow-path abutment of first bridge W. of Clute's dry dock, end stone, second course below coping, marked ⊗—B. M. with chisel.....	11.294	192.288
68.	At station 543, on face of tow-path abutment, second bridge W. of Clute's dry dock, sixth course below coping near E. angle, marked ⊗—B. M. with chisel.	10.900	191.894
69.	At station 568, on face tow-path abutment, third bridge W. of Clute's dry dock, fifth course below coping near W. angle, marked ⊗—B. M. with chisel	10.959	191.953

No.	Description.	Elevation above C. B.	Elevation above T. W.
70.	At station 598 1-2, on face tow-path abutment, road bridge at Whitehead's dock, on sixth course below coping near centre of abutment, marked B. M.—⊗ with chisel.....	+9.529	+190.523
71.	At station 633 3-4, on face tow-path abutment of farm bridge, near centre on projection of footing course, sixth below coping, marked B. M.—⊗.....	8.163	189.157
72.	At station 658 1-2, on face tow-path abutment of second bridge E. of lock 19 on projection on fifth course below coping near E. angle, marked ⊗—B. M. with chisel.....	9.710	190.704
73.	At station 693 1-4, on top of E. corner, first stone under coping, E. wing of tow-path abutment of first bridge E. of lock 19, marked ⊗ (on top) B. M. (on face) with chisel.....	11.753	192.747
74.	Lower mitre-sill, lock No. 19, at heel of N. E. gate of S. lock (pier wall).....	0.000	180.994
75.	On coping lock No. 19 near ends of anchor, N. E. gate, S. lock (pier wall) marked ⊗—B. M. with chisel. {	17.22 lower level. 8.779 upper level. }	198.214
76.	At station 70, on N. corner of coping, at end of W. wing of tow-path abutment, road bridge at Vischer's Ferry, marked (on top) ⊗ and (on face) ⊗—B. M. with chisel.....	12.119	201.554
77.	At station 140, on rock, cut on rock at rear of tow-path, marked B. M. ⊗ with chisel.....	10.713	200.148
79.	Lower mitre-sill, lock No. 20 at heel of N. E. gate, N. lock.....	0.000	189.435
80.	On coping lock No. 20, at ends of anchor, N. E. gate N. lock, marked ⊗—B. M. with chisel..... {	18.660 lower level. 8.242 upper level. }	208.095
81.	At station 108½, above lock 20 on top of coping at E. end of wing berme abutment, road bridge at Fonda's basin marked ⊗ and (on face) B. M. with chisel.....	12.170	212.563
82.	Lower mitre-sill, lock No. 21, at heel of S. E. gate, S. lock.....	0.000	199.853
83.	On coping, lock No. 21, at ends of anchor, S. E. gate, S. lock, marked ⊗—B. M. with chisel..... {	19.720 lower level. +8.594 upper level. }	219.573

No.	Description.	Elevation above C. B.	Elevation below T. W.
84.	Lower mitre-sill, lock No. 22, at heel of N. E. gate, N. lock.....	+0.000	+210.979
85.	On coping lock No. 22, near ends of anchor, N. E. gate, N. lock, marked ⊗—B. M. with chisel.	<div> <div>20.180</div> <div>lower level.</div> <div>8.571</div> <div>upper level.</div> </div>	231.159
86.	At station 6½ on N. E. corner of coping on end of tow-path wing, N. end of upper Mohawk aqueduct, marked ⊗ and on face of stone, B. M. with chisel.	9.418	232.009
87.	At station 16, on top dowell in coping, near end of parapet, tow-path wing, south end of aqueduct ⊗, and on stone near it ⊗—B. M. with chisel.....	13.089	235.677
88.	At station 24½, on north wing of berme abutment of first road bridge west of aqueduct, top of coping marked ⊗, and on face of stone, B. M. with chisel...	12.928	235.516
89.	At station 143, on face of tow-path abut- ment, Vedder's bridge, projection on lower course near W. angle marked ⊗, and on stone above, B. M. with chisel.	8.556	231.144
90.	At station 161½, on face of tow-path abut- ment of farm bridge near centre pro- jection of sixth course under coping, marked B. M.—⊗ with chisel.....	10.673	233.261
91.	Station 210, on face of tow-path abut- ment of R. R. bridge on stone near W. end about 2½ in. above joint marked B. M.—⊗ with chisel.....	11.031	233.619
92.	Station 230½, on top of coping on end of W. wing berme abutment of road bridge, marked ⊗—B. M. (on top of coping) with chisel.....	10.208	232.796
93.	Station 264, on top of coping on end of E. wing of tow-path abutment of road bridge, marked ⊗, and on face of stone B. M. with chisel.....	11.783	234.371
94.	Station 284. On top of coping on end of E. wing of berme abutment of Front street bridge marked ⊗, and on face of stone B. M. with chisel.....	10.189	232.777
95.	Station 311, on S. W. corner of coping of retaining wall E. of street bridge, marked ⊗, and on face of stone B. M. with chisel.....	13.695	236.283
96.	Station 337, on third step from bottom at E. end of tow-path abutment, State street bridge, marked ⊗, and on end of step B. M. with chisel.....	12.014	234.602

No.	Description.	Elevation above C. B.	Elevation above T. W.
97.	Station 368 1-2, on top of coping, S. W. corner of parapet of waste-weir, marked \otimes , and (on face) B. M. with chisel...	+11.630	+234.218
98.	Station 504 1-2, near centre of face of tow-path abutment of bridge at Navanier's bay on projection of sixth course below coping, marked \otimes , and on stone above B. M. with chisel.....	9.324	231.912
99.	Lower mitre-sill of lock No. 23, at heel of N. E. gate, N. lock.....	0.000	222.588
100.	On top of coping, lock No. 23, at end of anchor, N. E. gate, N. lock, marked \otimes —B. M. with chisel.....	<div> <div>16.900</div> <div>lower level.</div> <div>8.582</div> <div>upper level.</div> </div>	239.488
101.	Station 9, on face of tow-path abutment of farm bridge, near W. angle on projection of sixth course below coping, marked \otimes , and on stone above B. M. with chisel.....	9.115	240.021
102.	Lower mitre-sill of lock No. 24, at heel of N. E. gate, N. lock.....	0.000	230.906
103.	On coping of lock No. 24, at end of anchor, N. E. gate, N. lock, marked \otimes —B. M. with chisel.....	<div> <div>16.860</div> <div>lower level.</div> <div>9.534</div> <div>upper level.</div> </div>	247.766
104.	Station 49 3-4, on face of tow-path abutment of road bridge, on projection on course below coping, marked \otimes , and on stone above B. M. with chisel.....	12.402	250.634
105.	Station 99 1-4, on face of tow-path abutment of farm bridge, on projection on sixth course below coping, near E. angle, marked B. M.— \otimes (on the stone) with chisel.....	10.885	249.117
106.	Station 113+88, on E. end of Flat Stone Creek aqueduct, tow-path side abutment, six inches east of junction of wing and straight wall at foot of parapet, marked \otimes , and (on face of coping of parapet above it) B. M. with chisel.	10.068	248.300
107.	Station 181 1-2, near centre of face of tow-path abutment of road bridge, on projection of sixth course below coping, marked B. M.— \otimes , with chisel.....	12.237	250.469
108.	Station 218, near W. angle face of tow-path abutment of farm bridge, on projection of seventh course below coping, marked \otimes , and on stone above B. M. with chisel.....	11.462	249.694
109.	Station 294 1-2, at centre of face of tow-path abutment, first bridge below lock		

No.	Description.	Elevation above C. B.	Elevation above T. W.
	No. 25, on projection of footing course (seventh below coping), marked ⊗, and on stone above B. M. with chisel.....	+9.740	+247.972
110.	Lower mitre-sill of lock No. 25, at heel of N. E. gate, N. lock, marked ⊗....	0.000	238.232
111.	On coping of lock 25, at end of anchor, N. E. gate, N. lock, marked ⊗—B. M. with chisel.....	17.530 } lower level. 8.949 } upper level.	255.762
112.	Station 40 1-2, on corner of coping, end of W. wing tow-path abutment of farm bridge, marked ⊗ (on top) and B. M. (on face) with chisel.....	11.531	258.344
113.	Station 74, on face tow-path abutment of farm bridge (near W. angle), on projection of fourth course below cop- ing, marked ⊗, and on stone above, B. M. with chisel.....	12.321	259.134
114.	Station 118, on coping end of W. wing berme abutment of road bridge, marked ⊗—B. M. with chisel.....	11.530	258.343
115.	Station 171, on coping of parapet Sansai Kill Aqueduct, at E. angle (junction of wing with straight wall), marked ⊗—B. M. with chisel.....	12.650	259.463
116.	Station 253+80, on small granite boulder rear of tow-path (is about fifty feet east of line of stone fence between orchard and corn field on hill across canal), marked ⊗—B. M. with chisel.....	8.386	255.199
117.	Station 285 1-2, on flat white rock at N. angle of tow-path, opposite the middle of the bay, below lower end of rocky bluff on berme, marked ⊗—B. M. with chisel.	8.747	255.560
118.	Station 347, on flat sand stone at rear tow-path and at west end of first course below Swart's bridge, marked ⊗—B. M. with chisel.....	8.223	255.036
119.	Station 360 3-4, on parapet of culvert (berme side) of N. W. corner of coping, marked ⊗—B. M. with chisel	1.240	248.053
120.	Station 398 1-2, on top of stone under coping on E. wing of tow-path abut- ment of Klein's bridge, marked ⊗ (on face) and B. M. with chisel.....	12.485	259.298
121.	Station 460, on coping E. wing tow- path abutment of farm bridge, marked ⊗, and on face, B. M. with chisel....	12.492	259.305
122.	Lower mitre-sill, lock No. 26, at heel of N. E. gate, N. lock, marked ⊗—B. M.	0.000	246.813

No.	Description.	Elevation. above C. B.	Elevation above T. W.
123.	On coping lock No. 26, at end of anchor N. E. gate, N. lock, marked ⊗—B. M. with chisel	<div>+16.870 lower level. 8.505 upper level.</div>	+ 263.683
124.	Lower mitre-sill, lock No. 27, at heel of N. E. gate, N. lock.....	0.000	255.178
125.	On coping of lock No. 27, at end of anchor, N. E. gate, N. lock, marked ⊗—B. M. with chisel....	<div>16.430 lower level. 8.544 upper level.</div>	271.608
126.	Station 61 1-2, on retaining wall over berme end of culvert, five inches west of centre line, marked ⊗, with chisel...	3.379	266.543
127.	Station 96 1-2, on tow-path end of culvert at top of sloping coping, E. corner of second stone from E. side, marked ⊗—B. M. with chisel.....	2.109	265.273
128.	Station 163 3-4, on coping of waste-weir near N. W. corner of top of E. wall, marked ⊗—B. M. with chisel.....	8.723	271.887
129.	Station 203 1-2, on top of lower step at W. end tow-path abutment of street bridge (east bridge at Port Jackson), marked ⊗—B. M. with chisel.....	16.281	279.445
130.	Station 225 1-4, on top of coping at centre pier of Port Jackson creek culvert (T. P. side), marked ⊗, and (on slope) B. M. with chisel	0.727	263.891
131.	Lower mitre-sill, lock No. 28, at heel of S. E. gate, E. lock, marked ⊗—B. M.	0.000	263.164
132.	On top of coping lock No. 28, at end of anchor, S. E. gate, S. lock, marked ⊗—B. M. with chisel.....	<div>16.870 lower level. 9.147 upper level.</div>	250 034
133.	Station 85½, at E. end of tow-path abutment farm bridge on top of 3d stone above ground, marked ⊗ and (on face) B. M. with chisel.....	12.260	283.147
134.	Station 138, on centre face of tow-path abutment farm bridge, on projection of 6th stone below coping, marked ⊗—B. M. with chisel	11.717	282.604
135.	Lower mitre-sill, lock No. 29, at heel of N. E. gate, N. lock.....	0.000	270.887
136.	On coping lock No. 29, at end of anchor, N. E. gate, N. lock, marked ⊗—B. M. with chisel	<div>16.520 lower level. 9.121 upper level.</div>	287.407
137.	Station 30, on face of tow-path abutment of farm bridge, on projection of		

No.	Description.	Elevation above C. B.	Elevation above T. W.
	4th stone below coping, near E. angle, marked ⊗—B. M. with chisel.....	+12.491	+290.777
138.	Lower mitre-sill, lock No. 30, at heel of N. E. gate, N. lock.....	0.000	278.286
139.	On coping lock No. 30, at end of an- chor, N. E. gate, N. lock, marked..	<div> <div>19.370</div> <div>lower level.</div> <div>9.157</div> <div>upper level.</div> </div>	297.656
140.	Station 18 $\frac{1}{4}$, at foot of parapet, at end of W. wing, tow-path side of Schoharie creek aqueduct, marked ⊗ and on para- pet above B. M. with chisel.....	10.205	298.704
142.	Station 123 $\frac{1}{4}$, top of lower step W. wing, berme abutment of farm bridge, marked ⊗, and B. M. (on end of stone) with chisel.....	13.411	301.910
143.	Station 152 $\frac{1}{4}$, on face of tow-path abut- ment, near E. angle on projection of 5th course below coping marked ⊗, and (on stone above) B. M. with chisel.....	11.899	300.398
144.	Station 181 $\frac{1}{4}$, on face of tow-path abut- ment of farm bridge on projection of 6th course below coping, near W. an- gle, marked ⊗, and (on stone above) B. M. with chisel.....	11.595	300.094
145.	Station 253 $\frac{1}{4}$, on face of tow-path abut- ment of farm bridge near E. angle on projection of 5th course below coping, marked ⊗, and (on stone above) B. M. with chisel.....	11.474	300.883
146.	Station 281, on face of tow-path abut- ment of covered road bridge near W. angle of projection of 4th stone below coping, marked ⊗, and (on stone above) B. M. with chisel.....	12.070	300.569
147.	Station 306 $\frac{1}{4}$, top of lower step of W. wing berme abutment of farm bridge, marked ⊗—B. M. with chisel.....	13.485	301.984
148.	Station 345 $\frac{1}{4}$, on top of lower step, E. wing berme abutment of farm bridge, marked ⊗ with chisel.....	11.928	300.427
149.	Station 394, on top of lower step, W. wing of berme abutment marked ⊗ with chisel.....	11.331	299.830
150.	Station 482 $\frac{1}{4}$, on top of coping at end of E. wing of tow-path abutment of farm bridge, marked ⊗, and (on face of stone) B. M. with chisel.....	12.717	301.216
151.	Station 539, on face of tow-path abut- ment of farm bridge, near E. angle on		

No.	Description.	Elevation above C. B.	Elevation above T. W.
	projection of 4th course below coping, marked ⊗—B. M. with chisel.....	+11.359	+299.849
152.	Station 613, on face of top stone, end of W. wing, tow-path abutment of farm bridge on projection of stone, marked ⊗—B. M. with chisel.....	11.896	300.395
153.	Station 664 3-4, on top of coping at end of E. wing of Tokkon Creek aqueduct, tow-path side, marked ⊗—B. M. with chisel.....	8.024	296.523
154.	Station 737, on face of tow-path abut- ment of farm bridge, near E. angle on projection of fourth stone below coping, marked ⊗—B. M. with chisel.....	10.856	299.355
155.	Station 813 1-2, on top of second stone below coping, at end of E. wing of berme abutment of farm bridge at Yatesville, marked ⊗ and (on stone above) B. M. with chisel.....	10.594	299.093
156.	Station 846 1-4, on top of coping, N. E. corner, N. E. wing of Leonardson's Creek aqueduct, marked ⊗—B. M. with chisel.....	8.122	296.621
157.	Station 935, on top of coping of E. abut- ment of aqueduct, N. W. corner (tow- path side) of main wall, marked ⊗— B. M. with chisel	7.979	296.478
158.	Station 1,079 1-2, on top of lower step, W. wing, berme abutment of farm bridge, marked ⊗—B. M. with chisel.	12.336	300.835
159.	Lower mitre-sill of lock No. 31, at heel of N. E. gate, S. lock (on pier side)..	0.000	288.499
160.	On coping, lock 31, at end of anchor, N. E. gate, S. lock (pier wall) marked ⊗—B. M. with chisel.....	<div><div>14.760</div><div>lower level.</div><div>8.893</div><div>upper level.</div></div>	303.259
161.	Station 17 1-2, on face of tow-path abut- ment, Ferry street bridge, on projection of fifth course below coping (near cen- tre, old bench), marked ⊗—B. M. with chisel	10.392	304.758
162.	Station 49 1-4, on face, tow-path abut- ment of farm bridge, projection on fifth course below coping, near W. angle, marked ⊗—B. M. with chisel.....	11.325	305.691
163.	Station 82 3-4, on face of tow-path abut- ment of farm bridge, projection of sixth course below coping, near centre, marked B. M.—⊗, with chisel.....	9.990	304.356
164.	Station 142 1-3, on face of tow-path abutment of farm bridge, on projection		

No.	Description.	Elevation above C. B.	Elevation above T. W.
	of seventh course below coping, near W. angle, marked \otimes —B. M. with chisel.....	+8.824	+303.190
165.	Station 205 3-4, on face tow-path abut- ment of farm bridge, on projection of fourth course under coping (near cen- tre), marked B. M.— \otimes	9.873	304.239
166.	Station 252, on top of coping of parapet at N. E. wing of Plattkill aqueduct (N. E. corner of end stone), marked \otimes , and on face B. M. with chisel.	13.194	307.560
167.	Station 314, on top of coping at end of E. wing, tow-path abutment of farm bridge, marked \otimes , and (on face) B. M. with chisel.....	12.412	306.778
168.	Station 370 1-2, on rear upper corner of first stone under coping at end of W. wing, berme abutment of farm bridge, marked B. M.— \otimes with chisel.....	11.150	305.516
169.	Station 475 1-4, on tow-path abutment of farm bridge, near centre of face of E. wing, projection on second stone above ground, marked B. M.— \otimes with chisel.....	10.689	305.055
170.	Lower mitre-sill, lock No. 32 (at heel of N. E. gate, N. lock)	0.000	294.366
171.	On coping lock 32, at end of anchor, N. E. gate, N. lock, marked \otimes —B. M. with chisel.....	<div> <div>lower level.</div> <div>17.110</div> <div>upper level.</div> <div>8.984</div> </div>	311.476
172.	Station 27 3-4, on front corner, third step from bottom on E. wing tow-path abutment, iron street bridge, marked \otimes (and on end of stone), B. M. with chisel.		
173.	Station 60, on top coping at end of W. wing tow-path abutment, farm bridge, marked \otimes , and on face, B. M. with chisel.....	11.905	314.397
174.	Station 90, on face of tow-path abutment of farm bridge (near centre) projection of sixth course below coping, marked \otimes and (on stone above), B. M. with chisel.....	11.145	313.637
175.	Station 122, on coping of parapet, tow- path end of culvert at centre, marked B. M.— \otimes , with chisel.....	9.420	311.912
176.	Station 314 3-4, on corner of coping, E. wing wall of culvert, marked \otimes —B. M. with chisel.....	4.461	306.953
177.	Station 337, on face tow-path abutment of farm bridge at W. angle projection	6.712	309.204

No.	Description.	Elevation above C. B.	Elevation above T. W.
	on 6th course below coping, marked B. M.—⊗ with chisel.....	+10.353	+312.845
178.	Lower mitre-sill, lock No. 33, at heel of N. E. gate, N. lock.....	0.000	302.492
179.	On coping lock No. 33 at end of an- chor of N. E. gate, N. lock, marked ⊗—B. M. with chisel.....	<div>14.770 lower level. 9.066 upper level.</div>	<div>317.262</div>
180.	Station 29½, on coping of tow-path para- pet of culvert (near centre), marked ⊗ —B. M. with chisel.....	2.414	310.610
181.	Station 65½, on lower step, E. wing tow- path abutment of road bridge marked ⊗, and on face B. M. with chisel....	13.439	321.635
182.	Station 175½, on face tow-path abut- ment of farm bridge near E. angle pro- jection on fifth course below coping, marked ⊗—B. M. with chisel.....	11.421	319.617
183.	Lower mitre-sill, Lock No. 34 at heel of N. E. gate, N. lock	0.000	308.196
184.	On coping lock No. 34, at end of an- chor, N. E. gate, N. lock, marked ⊗ —B. M. with chisel ..	<div>17.080 lower level. 8.597 upper level.</div>	<div>325.276</div>
185.	Station 45½, on face of tow-path abut- ment of farm bridge near W. angle projection of 7th course below coping, marked B. M.—⊗ with chisel.....	8.774	325.453
186.	Station 94, on face of tow-path abut- ment of road bridge (E. creek landing) near centre projection of 7th course below coping, marked ⊗, and (on stone above) B. M. with chisel.....	10.912	327.591
187.	Station 174 1-4, on face of tow-path abut- ment of farm bridge, near W. angle projection of seventh course below coping, marked ⊗, and (on stone above) B. M. with chisel.....	9.829	325.598
188.	Station 217 1-2, on face of tow-path abutment of farm bridge, near centre projection of seventh course below coping, marked ⊗—B. M. with chisel.	9.619	326.298
189.	Lower mitre-sill, lock No. 35, at heel of N. E. gate, N. lock	0.000	316.679
190.	On coping, lock No. 35, at end of an- chor, N. E. gate, N. lock, marked ⊗—B. M. with chisel.....	<div>16.850 lower level. 9.065 upper level.</div>	<div>333.529</div>
191.	Station 35, at centre of face, W. wing, tow-path abutment, third course above ground, marked ⊗—B. M. with chisel.	11.233	335.697

No.	Description.	Elevation above C. B.	Elevation above T. W.
192.	Station 71, on top of coping, E. wing, berme abutment of farm bridge, marked \otimes —B. M. with chisel	+13.826	+338.290
193.	Station 216 1-4, on top of coping, E. wing, tow-path abutment of farm bridge, marked \otimes , and (on face) B. M. with chisel	12.053	336.517
195.	Lower mitre-sill of lock No. 36, at heel of N. E. gate, N. lock	0.000	324.464
196.	On top of coping, lock No. 36 (at E. end of hollow quoin stone), N. E. gate, N. lock, marked \otimes —B. M. with chisel	<div> <div>18.780</div> <div>lower level.</div> <div>8.761</div> <div>upper level.</div> </div>	343.244
197.	Lower mitre-sill of lock No. 37 (at heel of N. E. gate, N. lock)	0.000	334.483
198.	On coping, lock No. 37, at end of anchor, N. E. gate, N. lock, marked \otimes —B. M.	<div> <div>18.790</div> <div>lower level.</div> <div>8.892</div> <div>upper level.</div> </div>	353.273
199.	Lower mitre-sill, lock No. 38, at heel of N. E. gate, N. lock	0.000	344.381
200.	On coping, lock No. 38, at end of anchor, N. E. gate, N. lock, marked ..	<div> <div>18.520</div> <div>lower level.</div> <div>9.787</div> <div>upper level.</div> </div>	362.901
201.	Lower mitre-sill, lock No. 39, at heel N. E. gate, N. lock	0.000	353.114
202.	On coping, lock No. 39, at end of anchor, N. E. gate, N. lock, marked ..	<div> <div>19.830</div> <div>lower level.</div> <div>9.306</div> <div>upper level.</div> </div>	372.944
203.	Destroyed .....	.....	.....
204.	Station 97 1-4, on top of coping, end of E. wing, tow-path abutment of farm bridge, marked \otimes , and on face B. M. with chisel	14.010.	377.648
205.	Station 178 3-4, on top of coping, at end of W. wing, berme abutment of farm bridge, marked \otimes —B. M. with chisel.	14.463	378.101
206.	Lower mitre-sill, lock No. 40, at heel of N. E. gate, N. lock	0.000	363.638
207.	On top of coping, lock No. 40, at end of anchor, N. E. gate, N. lock	<div> <div>17.080</div> <div>lower level.</div> <div>8.556</div> <div>upper level.</div> </div>	380.718
208.	Station 73 1-4, on top of stone under coping at end of W. wing, tow-path abutment of farm bridge, marked \otimes , and (at end of stone) B. M. with chisel.	12.357	384.519
209.	Station 125, on top of coping, end of W. wing, tow-path abutment of bridge, marked \otimes —B. M. with chisel	12.802	384.964

No.	Description.	Elevation above C. B.	Elevation above T. W.
210.	Station 160 $\frac{1}{4}$, on top of stone under coping, W. end of tow-path abutment of farm bridge (near corner) marked \otimes and B. M. (on end of stone) with chisel.....	+11.914	+384.076
211.	Lower mitre-sill of lock No. 41, at heel of N. E. gate, N. lock.....	0.000	372.162
212.	On coping lock No. 41, at end of anchor, N. E. gate, N. lock, marked \otimes —B. M. with chisel.....	<div>16.850 lower level. 8.564 upper level.</div>	389.012
213.	Station 30, on top of coping, end of E. wing, tow-path abutment of farm bridge marked \otimes —B. M. with chisel.	12.861	393.309
214.	Station 109, on lower step, E. end of tow-path abutment of Herkimer road bridge, marked \otimes , with chisel.....	9.994	390.442
215.	Station 180 $\frac{1}{4}$, on footing course at E. end of tow-path abutment street railroad bridge, marked \otimes , and on end of stone above B. M. with chisel.....	9.511	389.959
216.	Lower mitre-sill, lock No. 42, at heel of N. E. gate, N. lock	0.000	380.448
217.	On coping lock No. 42, at end of anchor, N. E. gate, N. lock, marked \otimes —B. M. with chisel.....	<div>16.670 lower level. 8.716 upper level.</div>	397.118
218.	Lower mitre-sill, lock No. 43 at heel of N. E. gate, N. lock	0.000	388.402
219.	On coping lock No. 43, at end of anchor N. E. gate, N. lock, marked \otimes —B. M. with chisel.....	<div>16.500 lower level. 8.431 upper level.</div>	404.962
220.	Station 31, on top of coping at end of E. wing of tow-path abutment of farm bridge marked \otimes —B. M. with chisel.....	12.554	409.025
221.	Station 67 $\frac{1}{4}$, top of coping at end of E. wing tow-path abutment of bridge marked \otimes —B. M. (on face) with chisel.	13.124	409.595
223.	Station 130, on top of coping of parapet of aqueduct at W. end marked \otimes , and (on face) B. M. with chisel.....	12.087	408.558
224.	Station 150 $\frac{1}{4}$, on top of coping, end of E. wing tow-path abutment of farm bridge marked \otimes , and (on face) B. M. with chisel.....	12.864	409.335
225.	Station 185 $\frac{1}{4}$, on lower step on E. end of tow-path abutment of road bridge marked \otimes , and (on face) B. M. with chisel.....	11.772	408.243

No.	Description.	Elevation above C. B.	Elevation above T. W.
226.	Lower mitre-sill, lock No. 44 at heel of N. E. gate, N. lock.....	+0.000	+396.471
227.	On coping of lock No. 44 at end of anchor, N. E. gate, N. lock, marked ⊗—B. M. with chisel.....	19.970 lower level. 9.233 upper level.	416.441
228.	Station 45 $\frac{1}{4}$, at end of E. wing tow-path abutment of farm bridge, on corner of 4th stone under coping marked ⊗, and on stone above B. M. with chisel.	11.808	419.016
229.	Station 77 $\frac{1}{4}$, on face of tow-path abut- ment of farm bridge, on projection of 5th course from top marked ⊗, and (on stone above) B. M. with chisel...	11.769	418.977
230.	Lower mitre-sill, lock No. 45, at heel of N. E. gate, N. lock.....	0.000	407.208
231.	On coping lock No. 45, at end of an- chor, N. E. gate, N. lock, marked ⊗—B. M. with chisel.....	20.130 lower level. 8.958 upper level.	427.338
232.	Station 32, on stone under coping, end of E. wing berme abutment of farm bridge marked ⊗—B. M. with chisel.	11.534	429.934
233.	Station 47 3-4, at W. end of berme abut- ment of farm bridge, marked ⊗—B. M. with chisel.....	11.573	429.973
234.	Station 96 1-2, on top of coping at end of W. wing, berme abutment of farm bridge, marked ⊗—B. M. with chisel.	11.906	430.306
235.	Station 139 1-2, lower step, W. end of tow- path abutment of farm bridge, marked ⊗—B. M. with chisel.....	12.875	431.275
236.	Station 187 1-4, on lower step, W. end of tow-path abutment of farm bridge, marked ⊗, and (on face) B. M. with chisel.....	12.734	431.134
237.	Station 218, on face of tow-path abut- ment near W. angle on projection of sixth course from top, marked B. M.— ⊗ with chisel.....	11.847	430.247
238.	Station 296 3-4, on face of tow-path abutment of farm bridge on projection of seventh course from top near E. angle, marked ⊗—B. M. with chisel.	11.247	429.697
239.	Station 328 1-4, on face of W. wing tow- path abutment of farm bridge near W. angle projection of seventh course be- low coping, marked ⊗—B. M. with chisel.....	10.326	428.726
240.	Station 364, on face of tow-path abut- ment of farm bridge, projection of fifth		

No.	Description.	Elevation above C. B.	Elevation above T. W.
	course below coping, marked ⊗—B. M. with chisel	+12.737	+431.137
241.	Station 387 1-4, top of lower step at end of W. wing, tow-path abutment of farm bridge, marked ⊗, and (on face) B. M. with chisel	13.307	431.707
243.	Station 452, on top of coping of parapet at end of E. wing, tow-path side, Fer- guson Creek aqueduct, marked ⊗— B. M. with chisel.....	9.330	427.730
244.	Station 495 1-2, on lower step, E. wing, tow-path abutment of farm bridge, marked ⊗—B. M. with chisel.....	11.898	430.298
	Three chains west of Oneida county line (on Middle division), on lower step of E. wing tow-path abutment of Green bridge, marked ⊗, and (on face) ⊗— B M. with chisel	13.619	432.019
	(Mitre-sill, lock 46) 418.400, survey of 1876. (Mitre-sill, lock 46) 416.960, former record.		
	<u>1.440</u>		

MIDDLE DIVISION.

ANNUAL REPORT OF DENISON RICHMOND, DIVISION ENGINEER FOR
THE FISCAL YEAR ENDING SEPTEMBER 30, 1884.

SYRACUSE, N. Y., *October 1, 1884.*

Hon. ELNATHAN SWEET, *State Engineer and Surveyer :*

SIR — Obedient to the regulations established by act chapter 169, Laws of 1862, I have the honor of submitting herewith my annual report upon the Middle Division of the New York State canals for the fiscal year ending September 30, 1884.

The division extends from the east line of Oneida county to the east line of Wayne county, including the Erie canal between these boundaries ; the Black River canal and river improvement ; the Oswego canal and Oneida and Seneca river improvements ; the Cayuga and Seneca canal, and the numerous groups of feeders and reservoirs from which the water supply is obtained.

The following tables show the lengths of the separate canals, river improvements and feeders, also the water supply as far as measured.

No change has been made in the list as reported last year.

<i>Canals.</i>	<i>Miles.</i>	<i>Totals.</i>
Erie canal, from east line of Oneida county to east line of Wayne county.....	97.02	
Chenango canal, from Erie canal to lock No. 1.....	.15	
Black River canal, Rome to Lyons Falls.....	35.33	
Old Oneida Lake canal, Higginsville to first lock	1.05	
New Oneida Lake canal, Durhamville to Oneida lake.	5.30	
Oswego canal, from Syracuse to Oswego	38.00	
North and south side-cuts and slips at Salina.....	2.00	
Slips at Liverpool, Oswego canal .....	.21	
Baldwinsville side-cut .....	.75	
Cayuga and Seneca canal, Montezuma to Cayuga and Seneca lakes.....	22.77	
	<hr/>	202.58

River improvements..

Black river, Lyons Falls to Carthage	42.50
Onondaga outlet, Onondaga lake to Seneca river ....	.75
Oneida river, Three River Point to Brewerton at Oneida lake.....	20.00

	Miles.	Totals.
Seneca river towing-path, Mud lock to Baldwinsville.	5.75	
Seneca river, Baldwinsville to Jack's reefs	11.75	
Ithaca inlet, Cayuga lake to Ithaca	2.05	
Seneca lake outlet, from Cayuga and Seneca canal to Seneca lake .....	.26.	
	<hr/>	83.06

Navigable feeders.

Limestone Creek feeder, Erie canal to Fayetteville....	.80	
Butternut Creek feeder, Erie canal to Feeder dam above Dunlap's mills	2.00	
Nine mile creek (Camillus) feeder, Erie canal to Camillus.....	1.00	
Delta feeder, foot of lock No. 9, Black River canal to Delta.....	1.38	
Black River feeder, Boonville to head of pond at Forestport	12.09	
	<hr/>	17.27
Total		<hr/> 302 91 <hr/>

Artificial feeders not navigable.

	Miles.
Chenango canal, from lock No. 1 to lock No. 77....	26.72
Leland pond feeder .....	.32
Madison brook feeder.....	3.00
West branch feeder	5.74
Bradley brook feeder .....	.65
Hatch lake feeder.....	.23
Kingsley brook feeder	1.93
Oriskany creek feeder.....	.53
Mohawk feeder at Rome.....	.05
Oneida creek feeder	3.04
Cowassalon creek feeder .....	.38
Chittenango creek feeder .....	.28
Cazenovia lake outlet (improved) .....	.49
Tioughnioga river feeder .....	.70
De Ruyter reservoir outlet .....	.12
Butternut creek (Orville) feeder .....	.55
Nine mile creek (Camillus) feeder .....	.65
Carpenter brook feeder .....	.18
Skaneateles creek feeder .....	.10
Putnam brook feeder.....	.20
Centerport feeder.....	.24
Owasco creek feeder (including 859 feet of iron pipe).....	2.10
New outlet of Third Bisby lake.....	.06
New outlet of Canachagala lake.....	.16
Total	<hr/> 48.42 <hr/>

WATER SUPPLY.

Erie Canal — Frankfort and Rome levels.

($3\frac{356}{1000}$ miles of Frankfort level on Middle Division. The Rome level, lock No. 46 to No. 47 = $55\frac{257}{1000}$ miles.)

	Cubic feet per minute.
Leland's pond, Madison brook reservoir, Eaton brook reservoir, Bradley brook reservoir, Hatch's lake, Kingsley brook reservoir, Oriskany creek, feed through the Chenango canal into Frankfort level at Utica, half a mile east of lock No. 46, and through Oriskany creek feeder into the Rome level, six miles west of lock No. 46.....	6,000
Mohawk river, Black river, Forestport pond, White lake reservoir, Chub lake, Sand lake reservoir, Woodhull reservoir, first, second and third Bisby lakes, Canachagala lake, North branch reservoir, South branch reservoir, Twin lakes, feed through the Rome feeder and Black River canal into the Rome level at Rome, fourteen miles west of lock No. 46.	13,000
Oneida creek enters canal through feeder, thirty miles west of lock No. 46.....	1,000
Cowassalon creek enters canal through feeder, thirty-one and one-half miles west of lock No. 46.....	200
Cazenovia lake reservoir (for 100 days), Erieville reservoir (for 100 days), Chittenango creek, enter canal through Chittenango creek feeder, forty-one and one-half miles west of lock No. 46.....	5,641
De Ruyter reservoir (for 100 days) enters canal fifty miles west of lock No. 46.....	3,891
Limestone creek, natural flow, enters canal fifty miles west of lock No. 46..	500
Jamesville reservoir (for 100 days) enters canal fifty-two miles west of lock No. 46.....	2,000
Butternut creek, natural flow, enters canal fifty-two miles west of lock No. 46.....	500
Total.....	<u>32,732</u>

Short level, from lock No. 47 to No. 48 = $1\frac{88}{1000}$ of a mile.
Fed from Rome level.

Mile level, from lock No. 48 to No. 49 = $1\frac{14}{1000}$ of a mile.
Fed from Rome level through Short level.

Syracuse level, from lock No. 49 to No. 50 = $5\frac{14}{1000}$ miles.
Fed from the Rome and Jordan levels.

Jordan level, from lock No. 50 to No. 51 = $14\frac{203}{1000}$ miles.

Otisco lake reservoir enters canal through Nine-mile creek (Camillus) feeder, four miles west of lock No. 50.....	5,146
Nine-mile creek, natural flow, enters canal through feeder, four miles west of lock No. 50.....	800
Carpenter brook enters canal through feeder, ten miles west of lock No. 50.....	200
Skaneateles lake reservoir feeds into canal at Jordan, thirteen miles west of lock No. 50.....	8,766

Total.....	<u>14,912</u>
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Cubic feet
per minute.

Port Byron level, from lock No. 51 to No. 52 = $7\frac{22}{1000}$ miles.
Fed from Jordan level through lock No. 51.

Putnam brook feeder at Weedsport.....	200
Owasco lake reservoir, through feeder at Port Byron.....	4,033
Total.....	4,233

Montezuma level, Lock No. 52, to Wayne county line = $9\frac{22}{1000}$ miles.

Fed from Port Byron level, through lock No. 52, amount from Lake Erie.....	4,000
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Oswego Canal.

Erie canal at Syracuse.....	10,000
Seneca river.....	54,000
Oneida river.....	20,000
Total.....	84,000

Cayuga and Seneca Canal.

Seneca lake.....	18,000
Erie canal at Montezuma.....	4,000
Total.....	22,000

Black River Canal and River Improvement.

	Elevation in feet above tide water.	Surface area in acres.	Average area in acres.	Av. depth in feet.	Capacity in cubic feet.
<i>Canal.</i>					
White lake reservoir.....	1,500	.....	206	5	6
Chubb lake reservoir (approximate).....	1,500	.....	200	4	4
Sand lake reservoir.....	1,500	.....	206	15	15
Woodhull reservoir (two years in filling).....	1,854	1,236	1,118	18	57
First, Second and Third Blaby lakes (approximate).....	.....	.....	.....	23	4
Canaohagala lake (approximate).....	.....	.....	220	4	5
North lake reservoir (can fill twice yearly).....	1,821	428	277	28	38
South lake reservoir.....	2,019	518	372	24	48
Twin lakes (approximate).....	.....	.....	175	8	6
Forrestport pond.....	.....	.....	.....	.....	.....
Mohawk river through Delta feeder.....	.....	.....	.....	.....	.....
Pond above Lyons Falls dam.....	.....	.....	.....	.....	.....
<i>River Improvement.</i>					
Forge pond.....	1,091	.....	.....	.....	.....
First lake of the Fulton chain.....	1,091	.....	.....	.....	.....
Second lake of the Fulton chain.....	1,091	.....	.....	.....	.....
Third lake of the Fulton chain.....	1,091	.....	.....	.....	.....
Fourth lake of the Fulton chain.....	1,091	.....	.....	.....	.....
Fifth lake of the Fulton chain.....	1,091	9	.....	.....	.....
Sixth lake of the Fulton chain.....	1,772	100	.....	.....	.....
Seventh lake of the Fulton chain.....	1,772	807	.....	.....	.....
Eighth lake of the Fulton chain.....	1,772	809	.....	.....	.....
Black river.....	.....	.....	.....	.....	.....
Moose river.....	.....	.....	.....	.....	.....

SUMMARY OF WATER SUPPLY.

Erie Canal.

	Cubic feet per minute. Amounts.	Totals.
Frankfort and Rome levels.....	32,732	
Jordan level.....	14,912	
Port Byron level.....	4,233	
Montezuma level.....	4,000	
	————	55,877

Oswego Canal.

From Seneca river	54,000	
From Oneida river	20,000	
	————	74,000

Cayuga and Seneca Canal.

From Seneca river	18,000	18,000
		————
Total water supply.....		147,877
		=====

The latter part of the season of 1883 restored the water supply, which was so low at the beginning of that year, and the canals opened in 1884 with every reservoir full or only a little down. This condition of the reservoirs was fortunate, as the season has been a dry one and the evaporation excessive.

No trouble from low water has been experienced, except for a few days about the middle of August on the long level when the feed from the Black river reservoirs was not received as promptly as usual after the gates were open, because of the loss in filling up the dry, natural channels and intervening swamps.

At this time the water from the Woodhull reservoir occupied nearly six days in reaching the Erie canal, with a full reservoir and all gates hoisted, as I am informed by the superintendent in charge.

The construction of the proposed reservoir at Forestport will give a supply so much nearer the canal that any sudden draft on the long level can be promptly supplied and a more even surface maintained at all times.

Considerable time is always lost in sending special messengers to the most distant reservoirs over bad roads, which could be obviated and a much better system of communication established by telephone, when the condition of the water could be regularly reported to the assistant superintendent and recorded for future reference, as is now done with all other reservoirs, and any sign of weakness could also be reported and more quickly attended to.

Summary of Structures.

CANALS AND WATER-WAYS.		MECHANICAL STRUCTURES.									
	Lift locks.	Guard locks.		receivers.	Spill-ways, sluices, over-falls and bulk-heads.	Stop and guard gates.		Piers and breakwaters.	Totals.		
Erie canal		1		7					278		
Oswego canal	5	1		19	75				171		
Black river canal				10	10				201		
Cayuga and Seneca canal				13	3			1	66		
Onondaga lake canal				6				24	26		
Chenango canal used as a feeder				77	1				142		
Black river feeder	1								22		
Other feeders	1				10	10			121		
Side-cuts and slips					2				8		
River improvements	1			5				1	26		
Totals	8	2		35	107	3	455	41	2	12	1,006
OTHER STRUCTURES.											
Railroad tunnel											1
State shops											8
Division walls											3
Feeder pipe											1
Total structures on middle division											1,079

Navigation.

All the canals on this division were opened and ready for navigation May 6th, one day earlier than the year previous. Navigation has been uniformly good. The freedom of the division from breaks and failures is mainly due to the care and watchfulness of superintendents in charge who have consulted the engineer department when signs of danger of any description were observed and precautionary measures have been promptly taken as directed. A few unforeseen disasters have occurred, only two, however, interfered with the boating interest.

At Utica the caving in of the towing path required the level to be drawn down two feet, detaining loaded boats about twelve hours.

At Lyons Falls the failure of a waste weir and break through the bank stopped navigation on the Black River canal nearly eight days. These constitute the only detentions on the division worth mentioning.

Break at State Street, Utica.

September 21st the ground in rear of and including the towing path at State street, Utica, suddenly caved in and the water from the canal rushed into the cavity. It was at first supposed the connection of the city sewer, a brick arch with the forty-eight inch cast iron pipe that was laid under the canal in 1877, had failed. The water was quickly drawn down and a sheet piling cut-off made. About one hundred cubic yards of material were found to have disappeared, but subsequent examinations made as thoroughly as possible without

endangering navigation, indicated the city sewer to be uninjured and the apparent sudden loss of material in this view of the case might be accounted for as follows:

The connection was not made at the time the pipe was laid and it was necessary when this was done to make a cut, of fifteen feet. The bottom being quicksand the filling over the city sewer was composed largely of the same material which wasted through the newly constructed arch as the work progressed, on a down grade to the river. The underlying quicksand was thus drawn away at the upper end of the work and a cavity formed, when the breaking of the crust over the same, where heavy blocks of granite had been deposited, caused the caving toward the canal which allowed the water to pour in. In 1879, a similar break occurred over the connection of the sewer with the pipe on the berme side. At this time, however, the city sewer was found to have failed and upon the recommendation of the engineer department the city of Utica added two or more lengths of pipe which carried the connection so far from the canal that it could be uncovered in case any repairs were needed without endangering the canal, or sewer, as a break into it would undoubtedly damage it materially.

For the future safety of the canal and sewer, I would recommend the same course be pursued with the towing path side. The State laid the pipe across the canal and stopped at the blue line boundaries. The sheet piling cut-off allowed the canal to be refilled and the hole was then pumped out and excavations made to examine the sewer.

Clay and gravel was boated to the spot and puddled back. Several sheet piling courses were driven over and around the pipe to hold back the quicksand.

Leak at Durhamville.

A failure of a singular character occurred at Durhamville where the Oneida creek passes under the Erie canal through a double arch culvert of twenty-five feet chords, while the banks at this point are about thirty feet high. It was just after the close of navigation and when the head of water on the long level had been reduced about three feet, that the water commenced pouring out at the foot of the high embankment near the south-east end of the culvert wing.

The water was drawn off as quickly as possible, and dams built each side of the culvert to maintain some water in the level through the winter. The work of repair was immediately commenced and an excavation made entirely across the canal, thirty to forty feet wide and ten feet below canal bottom, where a mass of loose stone filling and old masonry was uncovered.

Nothing more was done until the frost was out in the spring, when it became evident that the cause of the leak was the gradual wearing away of the lining over the loose stone mentioned, during periods of freshets in the creek; and as this loose material extended, no doubt, to the bottom of the culvert and under the embankment, it was decided to concrete over the stone, grouting where required and then refill with puddled clay and gravel. This was done in a thorough manner and no sign of a leak has been observed since. The repair

was not completed until just before the time for opening the canals, and had it occurred earlier in the season, would have stopped navigation for several days at least.

Ordinary repairs made during the fiscal year, and repairs recommended — Erie canal.

Bottoming out was done by all the section superintendents, especially on the towing-path side; only the worst places, however, received attention; when the material was suitable, it was deposited on the towing-path or used in raising or strengthening the berme banks. Vertical walls where they had fallen down were rebuilt and the top of the slope walls more or less repaired. The wash from steam and excursion boats, however, keep the slope walls for two or three feet down from the top in bad condition by washing out the lining, and finally the wall fails and the wash-out would extend through the bank and cause breaks if not cared for. The section scows have distributed large quantities of stone and gravel in their endeavor to keep pace with this loss of material, but it is found impossible to do so, and in passing over the canals it is apparent that although much work has been done and many dangerous places repaired, the general appearance is not much improved from last year, and there is little prospect of keeping them perfect even if restored to their original condition as long as these boats continue their present rate of speed. A muddy receding wave follows along the wall continuously from behind their wheels, and at every trip they must do considerable damage of a nature difficult to repair.

More than the usual amount of new docking has been put on. Particular attention has been given to the towing-path this year; the material has been scraped from the back side to the front, and back ditches opened which will allow better drainage and insure a dry tow-path, and at the same time protect the paving.

The Superintendent of Public Works also placed four gravel scows on the division specially built for the purpose, having greater capacity than the ordinary section scow, and conveniently arranged for the work of graveling and raising the banks. As these boats are not generally called upon to do ordinary repairs, the steady work of improving the banks show good results.

In cities and villages the canal has become a receptacle for offal and filth of all description, requiring much labor to remove. The refuse of many manufacturing establishments is emptied into the canal while it is filled and is seen in unsightly piles after it is drained. The sewage matter along the basin or gulf in the city of Utica is poured into the canal and contaminates the water, while the removal of the solid portion became a necessity in the spring. To remedy this a sewer of sufficient capacity should be constructed across the canal to the river.

Locks.

Lock 52. In October last a leak under the foundation of lock 52, at Port Byron, interfered with the operation of the locks, and only by using the double locks simultaneously could boats be passed. The service of a professional diver from the Eastern Division was secured

and temporary repairs made by respiking the plank and securing them with new binders. After this repair no further trouble was experienced during the season.

Before the opening of navigation this spring the floors were removed in both the locks, and the spaces washed out between the foundation timbers and across the culvert were refilled with broken stone concrete, rammed to place with iron rods. It was then replanked and relined with new binders in both chambers; the locks were then repointed with Portland cement; mitre-sills repaired and put generally in first-class order. A new pier was built at the foot, and the one at the head repaired.

This failure, with that of lock 48 last year, was owing to the use of wooden piers when originally built. The plank had become water-worn around them and thereby loosened. It was decided to examine all the locks by boring through the floors, but no other cavities of any magnitude were found.

Lock 51. Repairs were made to pier.

Lock 50. Lock was coffer dammed and pumped out, when the plank-ing was found to be poor. This was partially renewed and mitre-sills repaired.

Lock 49. New lower pier was built.

Lock 48. Concreted under tumble gates; mitre-sill repaired; culvert cleaned out and repointed.

Lock 47. Culvert cleaned out and repointed, and new tumble gate inserted.

Lock 46. Concreting was done among the timbers of the apron of the tow-path lock and new bottom plank put on; apron in berme lock was replanked; one pair of upper gates was put in. In addition to the above, repairs were made to the machinery and gates of all the locks.

Dams.

New face plank were put on Cowassalon feeder dam, and apron was also repaired.

Protection walls at Rome feeder dam were extended and completed. A hole is washed out at the foot of the apron at the south end. The dam should be protected with a crib filled with stone.

Limestone creek feeder dam was repaired, but is badly decayed and should be rebuilt of stone. A new apron 250 feet long has been built at Oriskany dam, and the dam proper replanked, as it leaked badly. A portion of the old apron of this dam was washed away as low as the bottom of the river this spring.

Waste-weirs and bulk-heads.

Waste-weir on Limestone creek feeder was repaired. The wing walls of Pool's brook waste-weir were extended to strengthen bulkhead. New gate house has been built at Fort Bull waste-weir.

Waste-weir bulk-head between bridges Nos. 32 and 33 needs repair.

Waste-weir east of Higginsville should be taken down and rebuilt; walls are braced.

Culverts.

Nearly one-half of the eighty-two culverts on this division of the Erie canal are single, double or triple stone arches, requiring few

repairs, except to the wings and parapets; the balance are mostly composite with masonry at ends. The parapets and wings of all the culverts abutting against the slope of the banks are easily affected by frost, and the masonry and coping of many of them are more or less displaced. A few have been repaired this year.

The wings of the culvert at Port Byron, between bridges Nos. 135 and 136, should be taken down and rebuilt, as they are in danger of falling. This should be done while the water is out of the canal. The balance are mostly composite, having wooden trunks with stone breast walls; the intention of which was to hold back the water in the streams sufficient to keep them always under water, thus preventing decay. During dry seasons, however, when the streams are low, or from displacement of the coping or leakage, they are often left exposed to the weather, and now show some signs of rot at the ends. When they are actually weak a settlement occurs, and in such cases they should be uncovered and examined. The culvert known as Kirley's, near Oriskany, is in this condition, and may be found so bad as to require a new trunk entire. The parapets and wings should be relaid, as the stone are displaced. The parapet and wings of Harbor brook culvert, and culvert between bridges 52 and 53, are also crowded over by frost, and should be taken down and relaid.

After the water was drawn off the Frankfort level, sink holes were noticed over the Nail creek culvert arch at the south-east side, and upon digging down it was found that in the repair of the original break, which was done hurriedly, a mass of loose stone had been covered imperfectly with concrete. These were taken out as low down as possible, and then grouted, after which the clay was puddled back. As both sides of the culvert entirely across the canal have now been repaired in this manner no further trouble is apprehended.

Ditches leading from many of the culverts have been re-opened and the culverts cleaned out. The annual deposit in some of the large culverts is considerable. The starch factory culvert, east of Utica, has three arches, and the openings were nearly closed up. The wooden-box culvert leading from Schwab's dry dock, Utica, where a break occurred last year, has been permanently closed up. The culvert leading from the dry dock at New London was uncovered and repaired. Nelson brook culvert at Erieville, a stone arch has been rebuilt from the foundation.

Aqueducts.

Crane brook aqueduct had three new gates.

Deposits under Cowassalon aqueduct trunk have been removed.

Minor repairs were made to other aqueducts.

Eleven spans of the Montezuma aqueduct were removed from the west end in 1882.

Nothing was done in 1883 or in 1884. As the present trunk was all rebuilt in 1873, and is found to be decaying, it should be gradually renewed. Timber for two spans has been delivered.

The stone work is very perfect, but should be repointed to keep it so.

Port Byron aqueduct needs new sides.

Centerport aqueduct needs new railing.

Jordan aqueduct needs new plank and gates.

Limestone aqueduct needs new plank.

Chittenango aqueduct needs new stringer bridge.

Cowassalon aqueduct needs new plank and guard rail.

Oriskany aqueduct leaks at ends.

Bridges.

Most of the bridges have had repairs, especially to the wood-work, some a few plank, and others an entire new floor.

On section 7 the bridges have all been painted and numbered, and the abutments repaired and repainted ; this has greatly improved the appearance of these structures.

On other sections this has not as yet been so generally done. The approaches to several of the bridges have been raised and new guard railings built.

Peterboro street bridge, Canastota. Complaint was made by the village authorities of the contracted sidewalk, forming part of this bridge, which they claimed caused great inconvenience, as the footways were frequently blockaded, more especially the west side, which receives the greatest amount of travel. Upon investigation this was found to be the case, and as the village had recently improved their street by paving with Medina sandstone, including the approaches to the bridge, the Superintendent of Public Works decided to widen the west side to twelve feet and erect a new sidewalk truss to support it. The work was done upon the plan as approved, and has greatly accommodated the citizens thereby. Suitable iron guard rails have been attached to the bridge and abutments.

Bridges Rebuilt.

Starch factory bridge, No. 2.

Hotel street lift bridge, Utica, No. 9.

Clark's farm bridge, No. 32.

Pool's brook bridge, No. 80.

Kirkville bridge, No. 81.

Geres farm bridge, No. 110.

Bridges that should be Rebuilt.

Platt street, Utica (No. 17), should be taken down and foot bridge built.

Road bridge over feeder at Oriskany.

Brainard's farm bridge, No. 29.

Parkhurst farm bridge, No. 30.

Kirley's farm bridge, No. 31.

Burns' road bridge, No. 43.

Herrig's road bridge, No. 46.

Lenox basin bridge, No. 67.

Fuller's bridge, No. 72.

May's Point change bridge, No. 19, and New London bridge, No. 49, should have new iron needle beams. These have been delivered ready for insertion.

Gere's landing bridge, No. 109, and Beaver street, Jordan, No. 119, need new wooden needle beams.

General repairs to floors will be required as heretofore.

OSWEGO CANAL AND TRIBUTARIES.

Oswego Canal.

Some bottoming out was done, followed by dredging after the canal opened.

General repairs have been made to all the bridges, and new docking or vertical wall built where necessary to protect the towing path.

Locks.

Lock No. 1.—New balance beams were put on and paddles repaired; needs new lower gates; covered sluice around lock 1 and lock 2 has been repaired, should be rebuilt for about 300 feet.

Lock No. 2.—Gates were repaired and new foot bridge rebuilt.

Lock No. 3.—Paddles were repaired.

Lock No. 4.—(Side cut lock.) Lower gates were put in; needs two new mitre sills laid.

Lock No. 5.—Gates were repaired: pier at foot should be rebuilt four feet down from top.

Lock No. 6.—Needs pointing and new lower gates; docking at foot needs repairs.

Lock No. 7.—Needs two new mitre sills and repairs to floor, also lower gates; this lock should be repaired immediately after navigation closes; to do so it will require coffer dams above and below the lock as there will be eight or nine feet of water on the foundation at a low stage of the river; repairs were attempted this spring but the water was too high; at best the leakage will be so great as to require larger pumps than is generally used on canal work.

Guard lock No. 3.—Docking at head is poor.

Lock No. 8.—Needs all new gates.

Lock No. 11.—Two new gates were put in; needs new docking at foot of lock.

Lock No. 12.—Needs new upper gates; 100 feet of vertical wall was built at foot of lock.

Lock No. 13.—Needs new balance beams.

Lock No. 15.—Needs one upper miter sill.

Lock No. 16.—Needs repairs to pier at foot of lock.

Lock No. 18.—Needs all new gates.

Bridges Rebuilt.

Clarke's bridge over south side cut.

Tow-path bridge at Three River Point, six spans.

N. Y. C. R. R. bridge has been raised as directed.

Change bridge, No. 11, has also been raised.

The following bridges are old and should be rebuilt, viz.:

Berry's and Avery's bridges over north side cut.

Foot bridge over Liverpool slip.

Bridge street, Phoenix.

Change and road bridge, Phoenix.

Hinmanville road bridge.

Pratt street bridge, Fulton.

Littlefield's change bridge.

The bridges generally need painting. Six spillways and several sluices have been rebuilt or filled up when found to be no longer required.

Oneida River Improvement.

At Caughdenoy fender piles have been driven above and below the lock. Docking at foot of the lock rebuilt and foundation of swing bridge repaired.

At Oak Orchard fender piles have been driven above and below the lock extending to the swing bridge. Two new lock gates inserted. The Oak Orchard swing is old and should be rebuilt this winter. The timber is delivered. One of the needle beams broke in August, letting a man with team and portable engine fall to the bank of the river. The bulk-head at end of dam was rebuilt and pier masonry relaid.

The cribs protecting swing bridge were rebuilt and refilled with stone.

Dams and Bulk-heads.

Phoenix dam.— Three new bulk-heads are building at the west end of the dam and two across the side canal at the east end. Three other bulkheads at the east end should be rebuilt, another year, which will complete these structures.

Oswego Falls dam.— Three new bulkheads have been put in at east end of dam.

Fulton dam.— The bulk-head at the east end of the dam should be rebuilt this fall. This bulk-head is fifty-five feet long and the water will be about fourteen feet deep. The coffer dam will be located just above the bulk-head and as the space is filled in by refuse from the saw-mill, located near the dam, the services of the State dredge will be required to clear the channel before the dam can be built. New lock-gates should be placed in the guard-lock connected with the bulk-head, or the present ones protected from the ice as they are old and rotten. The bulk-head at the east end is also poor and should be rebuilt; two crib ice-breakers should be repaired.

Van Buren dam.— The old bulk-heads have been protected with timbers as they are not used.

Minetto dam.— Three new bulk-heads have been inserted at the west end of the dam; the old ones were damaged by the ice and high water and came near being carried out; three crib ice-breakers were built five timbers high and abutments repaired.

The four bulk-heads across the Mill companies race, at Oswego, are old and decayed.

Sloping aprons.

The sloping aprons at Phoenix and Van Buren dams were never completed. At least one of these should be finished next year.

Baldwinsville Canal.

Some repairs have been made to dam and lock. Two sluices need rebuilding and float bridge repaired.

Oneida Lake Canal.

The elevated bridges, with their approaches, on this canal should be lowered, as the superstructures become unsafe, and culverts built instead, using the abutment stone.

Kelley's road bridge, being in a dangerous condition, was taken down and temporary crossing made in the prism just below.

The bents under Tubb's road bridge should be renewed if the superstructure is to be maintained.

The bridge at South Bay, also, should be rebuilt.

Cayuga and Seneca Canal.

Little bottoming out was done, but the State dredge has worked on the canal and at Cayuga and Geneva harbors, as the lakes have been very low. Eel grass has been troublesome and required cutting.

Locks.

Lock No. 1 requires two balance beams and new docking at head of lock.

Lock No. 2.—Two new upper gates were put in, and the lower gates repaired; needs one balance beam, and new docking at head of lock.

Lock No. 3.—New docking has been built at head of lock, and walls pointed above low water. This lock leaks more than any other on the division, and the taking down and relaying of the walls has been recommended. I think, however, it might be pumped out and the planking removed, when concrete could be worked under the walls and between the foundation timbers sufficient to remedy the difficulty. The portion that is under water now could then be carefully pointed. The trouble with the lock is the poor quality of the cement used when rebuilt.

The lock needs four new balance beams; the upper gates are also old; the high vertical wall at the side of the lock has been in danger of falling for several years, and has been recommended to be taken down and relaid.

Lock No. 4.—Gates have been repaired and one side of the lock replanked.

Lock No. 5.—New docking has been built at foot of lock. This lock fills up badly with sediment, and should be pumped and thoroughly cleaned out.

Lock No. 6.—Needs repointing; upper gates are old.

Lock No. 7.—Has had repairs; all gates are old.

Lock No. 8.—Walls have settled at head of gates and lining is old; will require pumping to repair.

Lock No. 9.—Needs pointing and a new balance beam.

Lock No. 10.—Four new gates were put in and chamber repaired; needs pointing.

Lock No. 11, at Montezuma.—Two new gates were put in; the facing of the lock is poor and the walls need pointing; the flume around the lock is so dilapidated that it will require rebuilding before the opening of navigation next year; the timber has been ordered; it will take about 27,000 feet B. M.

Bridges.

Bridges have generally had repairs, but none completely rebuilt, except some small ones.

The long towing-path bridge across the river at Seneca Falls has settled and required shoring; it should be rebuilt, together with the end wooden abutments; the piers are in good condition.

The towing-path bridge over the slip at Seneca Falls is bad; both spans should be rebuilt; the timber has been purchased.

The tow-path abutment at Canal street bridge, Geneva, is undermined; it should be protected from further damage.

All the iron bridges need painting.

Dam at Waterloo.

About forty feet of the upper portion of the State dam at Waterloo, which holds back the waters of Seneca lake, was carried away April 12th. The water poured through the breach with great force, wearing away the material and endangering the balance of the dam. As it was necessary to check the flow as quickly as possible, stone were boated from the nearest quarry and a dam of loose stone constructed around the break and as near to it as the current would permit. This was a safe and comparatively inexpensive cut off.

Later in the season, after Seneca lake had been drawn down, and the break in the timber work of the dam was being repaired, it was found that the wood work was so unsound and out of line that there was danger of its being carried away bodily with the next high water unless it was materially strengthened by bracing or partially rebuilding.

The State's portion of the dam is 190 feet in length with a bulk-head attached. The bulk-head, with the abutment walls, were unsafe, as was also the north abutment of the dam, while the entire structure leaked badly. The foundation is solid rock, and being in a section where good stone can be procured, I would recommend the building of a stone dam immediately below and abutting against the present one; also new stone abutments and timber bulk-head or flood-gates.

This can be done in the early fall to the best advantage, while the lake is low.

The immediate construction of this dam is anticipated, and the Assistant Superintendent of Public Works is now rebuilding the bulk-head and abutments in conformity with a plan that has been furnished by this department, showing proposed new structure entire.

Miscellaneous.

The pile docking at Geneva has been in bad condition for several years, requiring annual repairs. The piles should be cut off at low water line and a crib docking made.

About one-half of the Cayuga pier needs rebuilding three to four feet down from the top. The timber has been ordered. Fifty fender and guard piles should be driven above and below the railroad bridge to assist boats in making up their tows and entering the canal.

A new section scow should be furnished for this canal.

Black River Canal and River Improvement.

Considerable bottoming out was done before the opening, but there is still much material above canal bottom requiring the levels to be kept so full as to injure the sluices around the locks. The steam dredge has been constantly at work on the river.

June 8th. The wooden spillway on the short level at Lyons Falls was entirely washed out and the structure carried to the river a total wreck. The structure was twenty feet high including over-falls, and the breach about fifty feet wide. It was necessary to rebuild the spillway to regulate the water of this level, requiring much framing and necessarily slow work in puddling back selected material. The water followed the natural channel to the river, causing no land damages.

Locks.

Bush's lock on the Black river is a timber structure large enough to pass steamboats. The sides are badly decayed down to low water mark and the work of rebuilding has commenced. It is not thought, however, that more than one side can be completed this fall. Four new gates are to be inserted and mitre-sills repaired. Otter creek lock is a similar structure and although its general appearance is better, it will no doubt be found in bad condition when the lining is removed; a new gate and other repairs will at least be necessary; forty-nine new lock-gates have been inserted in the canal locks and about 100 balance beams put on, while most of the locks have been more or less repaired; it is estimated that as many new gates will be required another year; fourteen locks on section No. 1 and some on No. 2 have been repointed; the chambers of a few have been dressed off where they were crowded over by the action of frost; new docking has been put on at the head of the locks from 31 to 74, inclusive; on section No. 1, particularly, the banks around the locks and the towing-path generally have been repaired with slate and gravel; many of the sluices and waste-weirs have been repaired or rebuilt; other locks should be repointed another spring.

Bridges.

All the river bridges have been replanked; the wrought-iron bridge at Carthage has had extensive repairs; a teamster and horses with load of timber broke through the Illingsworth swing bridge in July, owing to failure of one of the needle beams; new ones were inserted. The Parker Beach and Glendale bridges were repaired; two new spans across the Beaver river, at Naumburg, are now building; twelve new bridges have been built and the following need rebuilding: Forestport, Stefhann and Manchester bridges over the Forestport feeder, and the Yerden tow-path bridge at Delta, Farr bridge, Crowell bridge and bridge near Westernville, over the canal.

Dams.

The Delta dam that turns the Mohawk river into the Black River canal, a few miles above Rome, is a timber structure over 200 feet long and has had extensive annual repairs; the spring floods having washed away portions of the crib apron; this year it was decided to rebuild

the same upon a more substantial plan, which has been approved by the State Engineer and Surveyor, and the work is now in progress ; over 100 piles will be required to which the solid timber apron will be securely anchored ; the dam, proper, will also be repaired and refilled with stone where washed out ; the entire structure will then be in thorough repair.

Miscellaneous.

The channel at A. Hall's culvert was cleaned out and 500 lineal feet of slope wall at the sides overhauled or rebuilt. Lansingkill feeder has been cleaned out and 200 lineal feet of slope wall put in at the side of the creek near Dunnbrook to protect the towing-path. A new bulkhead has been built at lock 70. Well's creek aqueduct should be entirely rewooded.

Reservoirs.

The wooden discharge culverts to North lake reservoir were rebuilt ; five in number.

Roads leading to the North Woods reservoirs have been repaired ; new corduroys built and brush cut.

Eaton brook bulk-head has been rebuilt and dam repaired.

The paved waste at Eaton reservoir needs repairs ; many of the stringer bridges over the feeders have been rebuilt.

The Solesville aqueduct and bulk-head have been rebuilt.

Repairs have been made to the road and around the dam at Otisco lake reservoir.

Madison brook feeder is badly filled up and should be cleaned out this fall.

The protection wall along the pond at Bradly brook feeder should be extended.

One of the valves leak badly at De Ruyter, the connecting bolts being broken.

The reservoir will be drawn down when new bolts can be inserted.

The well-house also needs repairs and a new rack built at the feeder dam.

The protection wall below the Owasco lake bulkhead is undermined.

Two new bulk-heads should be built at Skaneateles dam ; this work will require the use of a pump and about 100 feet of coffer dam above, and also a dam below the bulk-head ; it will not be safe to defer this work another year, although the water will be higher than usual in the lake and not less than eight feet deep above the sill ; when the water is out, the masonry should be thoroughly repointed.

The channel through which the water is drawn to the bulk-head is an artificial one extending out into the lake several hundred feet and is protected at the sides by coffer dams coursed with stone. The east coffer which protects the channel the most has been uncoursed or worn away for about 300 feet from the upper end. The stone should be replaced as the drifting sand is filling up the channel, while the timber portion is exposed and liable to be washed away.

SPECIAL APPROPRIATIONS.

Forestport Reservoir.

Chapter 453, Laws of 1883, appropriation \$20,000.

The construction of this reservoir now seems to be assured with a probability of commencing the work this fall.

An additional appropriation, however, will be necessary to make a reservoir of sufficient capacity to secure a supply that can be relied upon to feed the Rome level in case of emergency when other sources are exhausted or difficult to obtain in time for immediate relief.

Late in the fall of 1869, a preliminary survey for this reservoir was ordered by Hon. Horatio Seymour, jr., State Engineer and Surveyor, to get such information as could be obtained in about ten days. From notes then taken it was estimated that a fifteen-foot flow line would inclose 700 acres giving an average depth of seven feet. In 1881 an accurate flow line was surveyed by C. L. Phelps, twenty-one feet above the surface of the Forestport pond or crest of State dam below, and a map of the same made. Accurate calculations give the amount of land inclosed as $792\frac{24}{100}$ acres, as recommended in last year's report of D. E. Whitford, division engineer.

I would advise the dam to be built at least fifteen feet above the surface of the pond, this would make the entire height of the dam to the bottom of the river about twenty feet, and abutments twenty-five feet; a plan with these dimensions has been prepared; the spillway and apron to be about 200 feet in length, built in the crib form and filled with stone; the abutments to be of stone and the cross walls through which the cast-iron feed pipes are to be laid to be of stone also; to the lower end of the pipes it is proposed to attach the most approved form of valves, and for protection and convenience in operating to construct over the same a suitable well-house which can be reached by an iron ladder attached to the face of the cross wall.

The soil is sand intermingled with small stone and boulders, which will require blasting to remove, these can be finally used for filling cribs and protection walls; clay for puddling can be procured a short distance from the site of the dam along the banks of the river; piles can no doubt be cut from timber within the flow line; good stone for the abutments can be quarried along the Sugar river and boated up the feeder to the pond and perhaps to the dam; the greater portion of the flow ground will require cleaning, as it is covered with second growth timber; two roads cross the reservoir and will have to be raised and new bridge abutments built; the lower bridge should have an additional span as the water-way is so contracted that the abutments are being undermined.

With a fifteen-foot dam as before stated about 700 acres will be flowed with an average depth of seven feet, giving a capacity of 213,444,000 cubic feet. As the feeder at Rome has been calculated to furnish 13,000 cubic feet per minute, the amount stored would be sufficient to feed the canal eleven and one-half days if filled but once. The river, however, rises rapidly from the effect of summer rains so that it would be likely to be filled several times and can be kept so from the reservoirs above holding the water so received twenty miles nearer the Erie canal.

Lowering Columbia and Fayette Street Bridges over the Chenango Canal at Utica.

Chapter 482, Laws of 1884, appropriation \$3,000.

This law provides for rebuilding the bridges or for constructing culverts in place thereof. Nothing has as yet been done under this law, but the sum appropriated will, I think, be insufficient to lower the approaches and construct more than one stone culvert, and it is even doubtful if that can be built and the street paved for the amount named.

Dredging Cayuga Inlet.

Chapter 491, Laws of 1883, appropriation \$2,500.

The work has been done to the extent of the appropriation.

Lengthening Lock 50.

Chapter 80, Laws of 1884, appropriation \$30,000.

The necessary measurements for the work were taken before the canals were opened, and all plans and bills of materials have been made ready for commencing the work as soon as navigation closes.

The new lock will rest on a pile foundation, and be an extension of the berme lock, having same length and width of chamber as the present one, which makes the chamber when used as an enlarged lock 220 feet between quoins. This will admit two boats coupled together, and as the lower gates of the present lock will be retained in their present position either lock can be used for single boats if desired.

The device in operation on most of the Erie canal locks on this division should be attached to assist boats towed by horses in entering and leaving the lock.

Completing Fishways on the Oswego River.

Chapter 501, Laws of 1884, appropriation \$2,500.

No work has been done under this law, which is intended to provide for fishways at the Fulton, Oswego Falls, Phoenix and Baldwinsville dams. The four fishways put in last year at the Oswego, High, Minetto and Van Buren dams, on the Oswego river, were uninjured by high water or ice, and evidences of their efficiency are said to have been observed this summer.

ENGINEER DEPARTMENT.

The small force employed during the past year in the engineer department has been kept busy in the office preparing and copying maps, plans and bills, or in the field supervising work in progress. Good success has attended the construction of all work done under their direction, while the relations existing between the engineer and superintendent departments have been mutually pleasant. The provisions of special laws and resolutions have made extra work for the force, while some time has been occupied in preparing maps and in attendance at the sessions of the court of claims. During the fiscal

year this department has been in charge of Denison Richmond, division engineer, and David E. Whitford and R. R. Stuart, assistant engineers.

Following is a tabulated statement of engineering expenses :

The total expenditures are,

For ordinary repairs.....	\$6,750 52
For extraordinary repairs	160 20
Total	<u>\$6,910 72</u>

Comparative statement of engineering expenses on this division for the last five years:

For fiscal year ending September 30, 1880	\$11,162 01
For fiscal year ending September 30, 1881	14,095 58
For fiscal year ending September 30, 1882	9,518 44
For fiscal year ending September 30, 1883	9,172 31
For fiscal year ending September 30, 1884	<u>6,910 72</u>

Very respectfully yours,

DENISON RICHMOND,

Division Engineer.

Statement showing the names, rank and compensation of engineers on the Middle Division of the New York State canals, together with the incidental expenses from October 1, 1883, to September 30, 1884, inclusive.

ORDINARY REPAIRS — ERIE CANAL.

	Amount.	Total.
David E. Whitford, division engineer, salary \$2,400	\$400 00	
David E. Whitford, division engineer, travel....	78 73	
Denison Richmond, resident engineer, salary \$2,000	200 00	
Denison Richmond, resident engineer, travel....	37 81	
Denison Richmond, assistant engineer, 4 days at \$5 per day.....	20 00	
R. R. Stuart, assistant engineer, 34 days at \$5 per day.....	170 00	
R. R. Stuart, assistant engineer, travel	24 16	
R. R. Stuart, rodman, 68½ days at \$3.50 per day.	240 00	
R. R. Stuart, rodman, travel.....	28 78	
Arthur V. Meeker, leveler, 39 days at \$4.50 per day.....	175 50	
Arthur V. Meeker, chainman, 67 days at \$2.50 per day.....	167 50	
Denison Richmond, division engineer, salary \$2,400	850 00	

	Amount.	Total.
Denison Richmond, division engineer, travel....	\$153 66	
D. E. Whitford, assistant engineer, 130 days at \$5 per day	650 00	
D. E. Whitford, assistant engineer, travel.....	110 57	
R. R. Stuart, leveler.....	380 00	
R. R. Stuart, leveler.....	61 30	
	<hr/>	\$3,748 01

INCIDENTAL EXPENSES.

Stationery	\$49 95	
Fuel and light.....	46 55	
Postage and telegraph	45 15	
Miscellaneous	294 05	
	<hr/>	435 70
Total for Erie canal.....		<hr/> <hr/> \$4,183 71

ORDINARY REPAIRS — OSWEGO CANAL.

David E. Whitford, division engineer, salary \$2,400	\$100 00	
David E. Whitford, division engineer, travel....	9 35	
Denison Richmond, resident engineer, salary \$2,000	46 58	
Denison Richmond, resident engineer, travel....	8 15	
R. R. Stuart, assistant engineer, 5 days at \$5 per day.....	25 00	
R. R. Stuart, assistant engineer, travel.....	7 30	
Denison Richmond, division engineer, salary \$2,400	384 25	
Denison Richmond, division engineer, travel....	68 58	
D. E. Whitford, assistant engineer, 23 days at \$5 per day	115 00	
D. E. Whitford, assistant engineer, travel.....	6 50	
R. R. Stuart, rodman, 12 days at \$3.50 per day ..	42 00	
R. R. Stuart, rodman, travel.....	4 20	
R. R. Stuart, leveler, 30 2-3 days at \$4.50 per day.	138 00	
R. R. Stuart, leveler, travel.....	26 56	
	<hr/>	\$981 47

INCIDENTAL EXPENSES.

Miscellaneous.....	30 00
Total for Oswego canal	<hr/> <hr/> \$1,011 47

ORDINARY REPAIRS — CAYUGA AND SENECA CANAL.

Denison Richmond, division engineer, salary \$2,400	\$350 00
Denison Richmond, division engineer, travel....	56 92

	Amount.	Total.
D. E. Whitford, assistant engineer, 68 days at \$5 per day	\$340 00	
D. E. Whitford, assistant engineer, travel.....	67 65	
R. R. Stuart, rodman, 11 3-7 days at \$3.50 per day	40 00	
R. R. Stuart, rodman, travel.....	3 08	
R. R. Stuart, leveler, 55 5-9 days at \$4.50 per day.	250 00	
R. R. Stuart, leveler, travel	47 61	
Total for Cayuga and Seneca canal.....		<u>\$1,155 26</u>

ORDINARY REPAIRS — BLACK RIVER CANAL.

David E. Whitford, division engineer, salary \$2,400	\$100. 00	
David E. Whitford, division engineer, travel....	14 21	
Denison Richmond, division engineer, salary \$2,400	150 00	
Denison Richmond, division engineer, travel....	37 24	
D. E. Whitford, assistant engineer, 10 days at \$5 per day.....	50 00	
D. E. Whitford, assistant engineer, travel	6 21	
R. R. Stuart, leveler, 8 1-3 days at \$4.50 per day.	37 50	
R. R. Stuart, leveler, travel	4 92	
Total for Black River canal.....		<u>\$400 08</u>

ORDINARY REPAIRS — SUMMARY.

Erie canal.....	\$4,183 71	
Oswego canal.....	1,011 47	
Cayuga and Seneca canal	1,155 26	
Black River canal.....	400 08	
Total		<u>\$6,750 52</u>

EXTRAORDINARY REPAIRS — BLACK RIVER CANAL.

Making survey for dam in Beaver River.

Act chapter 551, Laws of 1884.

Denison Richmond, division engineer, salary \$2,400 per yr.	\$26 30	
Denison Richmond, division engineer, travel.....	7 62	
D. E. Whitford, assistant engineer, 4 days at \$5 per day..	20 00	
D. E. Whitford, assistant engineer, travel.....	21 65	
R. R. Stuart, leveler, 4 days at \$4.50 per day.....	18 00	
R. R. Stuart, leveler, travel	21 15	
Total.....		<u>\$114 72</u>

Making plan and directing work for dam in Black River above Forest-port Pond.

Act chapter 452, Laws of 1883.

Denison Richmond, division engineer, salary \$2,400 per yr.	\$39 45
Denison Richmond, division engineer, travel	6 03
Total	<u>\$45 48</u>

EXTRAORDINARY REPAIRS — SUMMARY.

Survey for dam in Beaver river.....	\$114 72
Plan, and directing work for dam in Black river.....	45 48
Total.....	<u>\$160 20</u>

WESTERN DIVISION.

ANNUAL REPORT OF THOMAS EVERSHED, DIVISION ENGINEER, FOR
THE FISCAL YEAR ENDING SEPTEMBER 30, 1884.

HON. ELNATHAN SWEET, *State Engineer and Surveyor* :

SIR — In pursuance of the regulations established by act chapter 169, Laws of 1862, relating to the engineer department, I have the honor of presenting to you my report on the Western Division of the State canals, for the fiscal year ending September 30, last past.

Since the abandonment of the Chemung, Crooked Lake and Genesee Valley canals, this division comprises the Erie canal only, which is divided into four repair sections, numbering from 8 to 11, inclusive, as follows :

	Distance in miles.
Section 8 commences east line of Wayne county, ends east line of Monroe county.....	35.924
Section 9 commences east line of Monroe county, ends at end of construction, section 284	39.624
Section 10 commences end of construction, section 284 ends Sulphur Spring Guard lock	46.560
Section 11 commences Sulphur Spring Guard lock, ends Buffalo incl. Hamburg canal	26.815
Total miles.....	48.923

The canal slips and navigable feeders are as follows :

	Miles.
Erie canal from east line of Wayne county to Hamburg st., Buffalo	148.92
Five slips in the city of Buffalo.....	1.60
Genesee river feeder in Rochester	2.25
Total miles	152.77

Unnavigable feeders:

	Miles.
Tonawanda and Oak Orchard feeder.....	11.55
Genesee valley canal, from Cuba reservoir to old lock No. 87.....	7.65
Genesee valley canal, from Scottsville to Rochester.....	11.00
Total miles.....	30.20

The sources from which the Erie canal receives its water supply, are

- 1st. Lake Erie.
- 2d. Tonawanda creek at Pendleton.
- 3d. Tonawanda and Oak Orchard creek feeder at Medina.
- 4th. Allen's creek through the disused Genesee valley canal at Rochester.
- 5th. The Genesee river feeder at Rochester.

The waters of Lake Erie are, however, the chief sources of supply for the whole division.

It enters the canal from the lake through the different slips in the city of Buffalo.

From this city it passes through a canal on the east bank of the Niagara river for a distance of twelve miles to the village of Tonawanda, where it enters the creek of that name near its mouth, from which point it reverses, in times of ordinary stage of water, the natural current of that stream for a distance of twelve miles, when at the village of Pendleton it enters the "Deep Cut," so called, and for a distance of seven miles passes through deep earth and rock cutting to the city of Lockport, where it descends by five locks to what is known as the "Long Level," between that place and the city of Rochester, passing through a country whose slope is very gradual in a northerly direction.

At a point twenty-eight miles east of Lockport it receives the water from the Tonawanda and Oak Orchard feeder, which, however, affords but little water during the summer months, but is quite useful in assisting to fill the canal in the spring.

At Rochester, ninety-three miles from Lake Erie, it receives the water from Allen's creek, which is brought down the disused Genesee Valley canal (now retained as a feeder) for a distance of eleven miles.

To give the railroad company to whom the canal was sold the free use of the bed of the canal in the city of Rochester, they were allowed to pass the water of this feeder under the bed of the Genesee river by means of a cast-iron pipe, and empty it into the Genesee river feeder on its east bank near the southern limits of the city.

The supply of this feeder from Allen's creek is about 1,200 cubic feet per minute, and is very constant during the summer months.

Besides the above amount of water thus passed into the Genesee river feeder, it can be made to furnish a large amount from the river itself by putting flush boards on the dam.

The usual amount, however, at this point is about 1,400 cubic feet per minute, which is derived from a reservoir situated in Allegany county near the village of Cuba.

The objections formerly raised by the inhabitants of that portion of the city of Rochester through which this feeder passes, on account of its supposed unhealthfulness, have subsided since the clear water from Allen's creek has been passed through it.

The bank of this feeder on the river side is low ; it should be raised, strengthened and rip-rapped in some places to prevent the possibility of flooding a portion of the city. The estimated cost of doing this is \$12,000. It could best be done by dredging out the bottom, and placing the materials on the bank, which would at the same time destroy the aquatic plants now growing in it.

The Cuba reservoir mentioned above, or, as it is sometimes called, the Oil creek reservoir, formerly supplied the summit level of the Genesee Valley canal.

The area of water surface when full is about 600 acres.

The dam which holds back this large amount of water is 2,200 feet in length, and is sixty-five feet in height where it crosses the original channel of the stream.

The water is conveyed through this dam by means of two cast-iron pipes of twenty inches diameter. From these pipes it is conveyed in a short feeder into the old Genesee Valley canal, here retained as a feeder northward as far as the Rockville reservoir (now disused), about seven and one-half miles distant, at which point it is turned into a creek, and finds its way into the Genesee river, and by that means to the head of the Genesee river feeder at Rochester.

At a point about two miles from the above described dam is a waste weir 110 feet in length, over which the spare waters of the reservoir when it is full escape into a ravine, and thence find their way into the Oil creek, a short distance below the village of Cuba.

Last spring a small leak was discovered at one end of this waste weir; it was temporarily repaired at the time, and since the water in the reservoir has been drawn down it has been thoroughly repaired, and the embankment, which had become impaired at this point, has been strengthened and rip-rapped in a thorough manner.

The Rockville reservoir, which was also used for the supply of the Genesee Valley canal, is still retained by the State, but is not used for storing water. It has been found to be necessary to raise the embankment at a small expense to prevent its being carried away in case of an extraordinary flood; this has been accomplished this fall.

The Consumption of Water.

The amount of water made use of on this division was treated on at length in my report of 1880; at that time east of Rochester it was very great; it was very much reduced thereafter; by following the suggestions made by me at that time, which were to see that the mill owners at Newark who make use of the surplus water got no more than could be readily spared, namely the amount in excess of the lockages necessary to supply the evaporation and filtration below that point, and that they made use of it, both night and day, a few hours at a time, and not all of it at any one time which floods the level below in a greater degree than is necessary, and to restrain the lock-tenders from using any more water in drawing boats into the locks and flooding them out again than is absolutely necessary, by following the rule that the lower paddle should not be opened until the bow of the descending boat is in the very jaw of the lock, neither should the water to flush it out be used any longer than is required to pass the stern beyond the lower mitre-sill.

Before these requirements were made on the lock-tenders, I found more water used for these two objects than it took to fill the locks. They should be at all times strictly enforced, as by this means much water is saved and delays to boatmen avoided.

The mitre-sill of the Clyde lock is six inches higher than that of the Port Byron lock; to keep the water up to seven feet in depth, on

that of the Clyde lock gives a greater surface descent than is required, and a greater flow than is necessary is the consequence; the banks on the Montezuma level should therefore be raised sufficiently to allow of the sides of the aqueducts which act as spillways being raised to correspond to the Clyde lock; this would at the same time facilitate the entrance of eastern-bound boats into the Port Byron lock by giving six inches more water between the bottom of the boat and the mitre-sill, and would also save bottoming out the canal at the western end of the level which is now needed to a considerable degree.

The material for raising these banks could be best procured by dredging out a portion of the bottom of the level where the material is of a good quality.

The growth of eel grass on the long level between Lockport and Rochester seriously impedes the passage of the water.

There is only one way to effectually cure this evil and that is to thoroughly bottom out that portion of the canal, either by hand or dredge boat. In my report of 1881, I gave the result of the latter method as practiced on the Illinois canal; in view of the large amount of silty matter which has accumulated in the prism of the canal on this division, and the difficulty of procuring men during the very short spring-time season intervening between the breaking-up of the frost and the opening of navigation on the canal, it would seem to be very desirable to adopt some such plan on this canal as has been so successfully used on that of Illinois.

Dams.

There are three dams proper on this division, besides the two on the Oil creek reservoir before described.

First. That across the mouth of the Tonawanda creek near its mouth. It is composed of trees, brush and gravel below with a course of square timber work on top forming an apron; it is 112 feet in length; there are flush boards on the top which brings the water up to the canal level, and are let down in case of floods, the total rise being about four feet. It has also at the north end a bulk-head containing twelve gates, four by five feet each, which are raised in times of floods in the creek. It is in excellent condition, having been thoroughly repaired in 1881.

Second. The Tonawanda and Oak Orchard feeder dam across the Tonawanda south of Medina. It is of the same character as that near its mouth. It is 150 feet long and raises the water about three feet, sufficient to throw the current through an artificial feeder into the channel of the Oak Orchard creek. It is also in good condition.

Third. The Genesee river feeder dam situate at Rochester. It is 510 feet in length, is built of timber and plank on a rock foundation; it has eight wooden piers in the center of the stream which allow of the passage of the water between them as though no dam existed; these spaces are filled in in a temporary manner whenever it is required to use the water for feeder purposes; the object being to prevent the overflow of lands above as much as possible during high water in the river. Four of these piers are decayed and should be rebuilt, the rest of the dam requires to be planked over; the embankment on the west end should be raised and the front rip-rapped; some repairs are also needed on the masonry which should also be pointed up. The estimated cost of these repairs is \$2,800.

Locks.

There are twenty-three locks on this division besides the weigh lock at Rochester.

Fourteen double lift locks 110 by 18 feet in the chamber with various lifts as follows :

No. lock.	Location.	Lift in feet.
53.	One and one-fourth miles west of Clyde	4.755
54.	At lock Berlin	7.360
55.	In the village of Lyons	6.251
56.	"Poor-house" one and one-tenth miles west of Lyons,	9.848
57.	In the village of Newark.....	8.028
58.	In the village of Newark.....	8.004
59.	In the village of Newark.....	8.002
60.	Eight-tenths of a mile east of Macedon.....	9.886
61.	In the village of Macedon.....	6.601
62.	Two and a quarter miles west of the village of Pitts-	
	ford	8.807
63.	"Millers" in the village of Brighton	8.719
64.	"Sipples" in the village of Brighton	10.108
65.	"Reservoir" in city of Rochester	10.102
66.	"First lock" in city of Rochester.....	8.859
67-71.	Five double combined locks in the city of Lockport.	57.427

One guard lock at Sulphur Springs, above Lockport, has chamber 110 x 20 feet, with two additional head gates of similar character to lock gates. These as well as the lock itself usually stand open, being only shut when there is a flood in Tonawanda creek and during the winter season.

One "river lock" at Tonawanda village, a lift lock (single) connecting the Niagara river with the canal. The rise is generally about four feet, dependent on the height of the water in the river.

One double chambered guard lock at Black Rock 112 x 20 feet. The lift, together with the fall in the harbor, is generally about two and a half feet, varying with the stage of water in the lake.

Taking low water, as per United States engineer record, it is	2.425
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Total lift.....	175.182
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By adding to the above lift the surface descent on the different levels, we get the total rise on the division.

On the Montezuma level, between the Richmond aque-	
duct over the Seneca River and the lock at Clyde No. 53,	
there is 0.524 at present, which is 0.328, or four inches too	
much, there should be.....	0.196
On the "Twelve-mile" level between locks Nos. 59 and 60.	0.165
On the "Seventeen-mile" level between locks Nos. 61	
and 62.....	0.343
On the "Three-mile" level between locks Nos. 62	0.063
and 63	0.063

Location.	Lift in feet.
On "Long level" between Rochester and Lockport, locks Nos. 66 and 67	3.165
On level between Lockport, lock No. 71, and Black Rock guard lock	1.239
Total rise going west.....	<u>180.353</u>

Weigh Lock.

There is one weigh lock in the city of Rochester. It is in good condition, except the tumble gate at the west end, which requires renewing. It is not now used for weighing, but is sometimes used by sinking boats.

Repairs to foundations were made last spring to the following locks: In 56, 57, 58 and 65 the foundation plank were taken up either in whole or in part, and the spaces between the timbers refilled with concrete.

The plank were taken up and replaced by new, and the locks made tight in lock 59 and the Lockport locks.

In the River lock at Tonawanda the lining was renewed and timbers placed across the lock every two feet apart and heavily bolted to the foundation timbers below to keep the plank from rising, so that the lock can now be pumped out at any time without recourse to cofferdams at each end which have been required hitherto.

New mitre-sills were inserted in locks Nos. 57, 59, and at locks Nos. 56, 60, and the River lock at Tonawanda; the mitre-sills were faced with new timbers for the gates to shut against.

The following locks were pointed up with Portland cement last spring: 53, 54, 55, 57, 58, 59, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71 and the River lock at Tonawanda.

The gains were cut afresh to receive the stop timbers in the following locks: 62, 63, 64, 65, 66 and 71.

New ones were made at each end of the river lock at Tonawanda of sufficient size to receive stop timbers to take the place of coffer dams.

A new breast-wall was built at the head of lock 65 to prevent leakage.

The wing-walls at the foot of the locks at Lockport were found to be very much undermined; they were thoroughly repaired and underpinned.

A new tumble gate was put in lock 60.

New sets of gates were inserted in locks 56, 60, 67, 68, 71 and guard lock at Sulphur Spring. At river lock, Tonawanda and the guard lock at Black Rock, two sets each.

New paddles were inserted in the gates of locks 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65 and 66.

The foundations to the following locks need repairs by grouting between foundation timbers and renewal of planking: 54, 56, 59, 60 and 64.

New mitre sills are needed at locks 57 and 60.

The following locks require repointing: 53, 56, 60, 61, the guard locks and the ship lock at Black Rock. In the latter a good many of the coping stone have been thrust back by the concussion of the heavy vessels passing through it, and other stone have been broken up from the same cause; they should be replaced and renewed.

The gains should be recut in the following locks to receive stop timbers, the stone having been worn away so as to obliterate them: 53, 54, 55, 56, 57, 58, 59, 60, 61.

At lock 60 the centre wall on the north side requires to be taken up and relayed for some distance below the upper hollow quoin and down about six feet.

Some of the coping on lock 71 has become decayed; they should be replaced.

New lock gates are needed, one pair each, at locks 54, 55, 57, 60 and 65, and two pair at the guard lock at Black Rock; one of the guard gates at Sulphur Spring also requires renewal.

New tumble gates are also required at locks 53, 54, 58 and 64, and two at lock 56, and one repaired at lock 60.

Quite a number of new balance beams are required on the division, and forty-five new paddles at locks 53 to 66. The loss of water in consequence of leakage through and around the paddles, and between the mitre sills and the gates, is a serious impediment to navigation, as it hinders the drawing in of loaded boats going west. The rendering of these tighter deserves increased attention. I would recommend the replacing of all the old wrought-iron paddles with those of wood and iron combined as soon as possible; also the renewal of the mitre sills when worn away by the action of the water. I would suggest facing them with heavy angle iron.

The mitre sills of the Lockport locks, originally of stone, have become split in many cases. It would be well to replace the stone with wood, or wood and iron combined.

Aqueducts.

There are four on this division, viz.: one each at Lyons and Palmyra, both of which have wooden trunks, and one each at Rochester and Medina, both of which are wholly of stone.

The one at Lyons is in good condition; in that at Palmyra the floor timbers are very much decayed; they should be replaced by new ones. Of the Rochester aqueduct I beg to repeat what I have already said in my former reports, viz.: that it should be repaired by having its bottom covered with a coating of cement mortar or asphalt to replace one of a preparation of tar put on it some years ago, and which has long since been decayed and valueless for the purpose for which it was intended. Estimated cost, \$2,800.

The aqueduct at Medina should have the earth removed from behind the parapet walls and over the trunk, when it should be grouted up thoroughly and pointed; some concrete and other masonry as well as puddled clay will be needed. Estimated cost, \$550.

Both these aqueducts should be attended to at once, or they will become seriously injured by frost and other causes.

Waste Weirs.

There are twenty-four on this division. They have been made to agree with the surface levels of, and serve to regulate the, flow of the water throughout the division. They are for the most part in good condition.

The wood-work on those at Newark, Johnson's creek and Maybee's was renewed last spring; the masonry on the two last was relaid.

The wood-work of the following requires to be renewed: Clyde, Lock Berlin, Brockville, Middleport, Medina and Lockport. The masonry also to be relaid in part and the rest pointed up as well as those on the three-mile level and at Brockport.

Bridges.

There are 217 bridges on this division which belong to the State over the Erie canal and slips in Buffalo. Of these, 206 are of single span, one has two spans, four have three spans, three are swing bridges and two are wooden draw bridges over slips.

There are three lift bridges owned by the city of Rochester, viz.: Allen, Brown and Lyell streets.

There are also three wooden truss bridges over the State ditches in Tonawanda village and five of iron in or near the same village, one iron road bridge over the Oak Orchard creek feeder and one iron road bridge over the old canal at Knappville.

There are also fifty-two small bridges spanning the State ditches in Niagara and Erie counties.

The following bridges have been renewed entirely of wood during the present year: Nos. 7 and 168, the latter of three spans situate at Sulphur Spring guard lock.

Nearly all the bridges on the division have had repairs made on them, notably: 60, 72, 76, 103, 108, 119, and nearly all the bridges in the cities of Buffalo and Rochester have been planked over anew.

At the following places old wooden bridges have been replaced by iron ones:

i No. 27, Peakes, one mile west of Newark, by one from Horseheads on the Chemung canal, lengthened by the insertion of two panels.

No. 170, across the old canal at Pendleton, with one fitted over from one of the spans of the Ischua aqueduct on the Genesee Valley canal.

No. 112, at county line between Orleans and Niagara, by one composed of one truss from Lyell street, Rochester, supplemented by a new one.

The following wooden bridges will have to be rebuilt during the coming fiscal year: Nos. 28, 51, 91, 132, 134, 151, 142, 149 of one span and 173 of two spans; 44, 45 and 57 which have lower chords of iron will require rewooding. No. 100 will be replaced with an iron one now in the State yard at Rochester.

Plans for an iron bridge to take the place of a temporary wooden one at Louisiana street, in the city of Buffalo, over the Hamburg canal, have been prepared.

Plans are being made for an iron tow-path bridge over the mouth of the Scajaquada creek, in Buffalo, to be erected before the opening of navigation next spring.

An iron bridge is to be erected at Prospect street, Medina, by special enactment by the Legislature; it will have a span of 100 feet; plans for which have been prepared.

Repairs are needed to the trusses of the iron bridges Nos. 18 and 30, and to the following wooden bridges: Nos. 5, 15, 33, and to No. 163, Main street, Lockport, a large wooden structure now much decayed.

The iron bridge at Hamilton street, Buffalo, No. 190, is too low ; as it is frequently struck by light boats, it should be raised fifteen inches.

The swing bridge over the slip to the Ohio basin in Buffalo is very much out of order ; it requires considerable work on both masonry and turntable, as well as the superstructure itself.

A much decayed wooden bridge over the Stats ditch at North Tonawanda should be replaced by a rubble stone arch, the cost of which I estimate at \$2,100, after which no further expense would have to be incurred for repairs.

Masonry of Bridges.

The stone for new abutments are on the ground to take the place of bents, which are much decayed at bridge No. 45, in the village of Fairport ; estimated, \$400.

New abutments will have to be constructed for the road bridge over the Tonawanda creek at Pickards, No. 174 ; estimated, \$900.

New abutments must also be built for the new tow-path bridge over the Scajaquada creek, Buffalo ; estimated \$800.

Repairs to Masonry.

I beg leave to report what I have mentioned in my former reports in relation to the unfinished condition of the berme abutment of the Culver road bridge No. 62, in the city of Rochester, in which the wings are entirely wanting. The embankment is quite narrow in consequence and dangerous ; estimated cost \$450.

Nearly all the abutments on the division require repairs, the whole of which I estimate at \$5,500.

Piles should also be driven to protect some of them from being damaged by boats under the action of heavy winds.

Culverts.

There are 136 culverts of various kinds on the division.

No. 2, near Pitt lock, has a wooden trunk which has been allowed to become dry ; it has decayed in part ; it is to be repaired before the opening of navigation next spring.

No. 36, on the three mile level, is of the same character ; it is much decayed ; it should be replaced by stone masonry or iron pipes, which would be preferable, as the foundation is in quicksand ; estimated cost of pipes, \$4,700.

The culvert leading from the back ditch to the canal on the mountain ridge west of Lockport at Murphy's farm, has given way ; it should be repaired at once ; estimated cost, \$750.

A small culvert under the Genesee river feeder in Rochester has given way ; it should be replaced by a wooden trunk ; estimated cost, \$350.

The masonry of all the culverts on the division require more or less repairs ; in many the wing walls and parapets have been entirely thrown down by the frost ; they should be replaced, and should have broken or field stone placed behind them as a protection from the action of the frost in the future. Estimated cost of all such repairs, \$6,000.

Stop-gates.

There are six stop-gates on this division, viz.: at Bushnells basin and Cartersville, on each side of the heavy embankments of the Irondequoit; one at Adams basin, two near Holley, one on each side of the heavy embankment at that place, and one near Medina.

The following repairs were made last spring: The wood work of those at Medina, East and West Holley were rebuilt, and the masonry and wooden piers repaired. The wood work of that at Adams basin requires to be renewed and the masonry laid over with additional stone work; estimated cost, \$300.

Vertical Wall.

The vertical walls on this division are very much out of order, especially in Buffalo, Rochester and Albion. The elements during the time which has elapsed since they were built, and the imperfect manner in which they were constructed, have had the effect which may be expected on such structures. When they are repaired they should be taken down entirely, fresh stone of a better quality than those originally used added, and such alignment made use of that when in course of time all have been rebuilt they will present a uniform and proper appearance.

Last spring about 150 feet of slope wall was taken down at the bend just east of the Lyons lock, and vertical wall of excellent quality substituted therefor, an improvement which has long been needed; about 250 feet more will be laid over next spring, the stone being on the ground therefor.

About fifty feet on each end of the Palmyra aqueduct on the berme side of the canal should have a twisted wall from vertical to slope, constructed of good flat bedded stones to insure the same against future breaks.

A piece of vertical wall on Commercial slip has fallen into the canal; it should be rebuilt with heavy stone and should have a good pile foundation with sheet-piling behind it as is usual in the locality.

Slope Walls.

The slope walls on the long level between Rochester and Lockport are very much out of shape by the action of frost on the peculiar soil, a mixture of clay and quicksand, through which the canal passes.

Sheet Piling.

The sheet piling on the heavy embankment over the Irondequoit was very much decayed; the greater part of it above canal bottom was replaced by new plank last spring, it is proposed to replace the rest next spring.

Canal Banks.

In several places on this division weak places occur from various causes, and low places occasioned in some instances by the settlement of the banks exist. These should be strengthened and raised, notably the Montezuma level, where the raising the banks would serve two

purposes, the saving of the expense of bottoming out and giving more space between the bottom of the boats and the bottom of the aqueducts and the mitre sill of the Port Byron lock.

Towing Path.

Considerable improvement has been made this year in the state of the towing path, especially on Tonawanda creek where it has been faced with stone for several miles, the stone having been purchased from the contractor on the Buffalo sewer which lay near the canal and came in very usefully for this purpose.

Prism of the Canal.

The usual amount of work was done last spring in removing matter of various kinds from the canal bed; on section eight much more was performed. As I have hitherto mentioned, this does not keep pace with the accumulation, and other means must be resorted to.

The harbor, canal, basin and slips in the city of Buffalo require also constant dredging, as well as that portion of the canal between Black Rock and the Sulphur Spring guard lock, a distance of 25 miles.

About two years ago I had soundings taken and a map made showing the amount of dredging then required to restore the canal, harbor, basins, etc., in the city of Buffalo; it amounted to 185,000 cubic yards. This has arisen in a great measure from two causes — one the constant emptying of all the sewage matter of the city of Buffalo into the canal, which, floating down, tends to fill up not only the canal and harbor in Buffalo, but extends to the canal itself to a distance far below Lockport. Another cause is the dumping of the material dredged from the harbor and slips, etc., in the city of Buffalo so far to the southward that the westerly gales drive it inside the Black Rock or Bird Island pier. I think that action should be taken on the subject of a proper dumping ground that would not interfere with the keeping the canal and harbor clear of this deposit.

Bird Island Pier.

Three pieces of the extension of this pier were carried away last fall by heavy storms; it was thoroughly repaired this summer. That portion has been filled in front with heavy stone to act as a protection to the crib work.

Erie Breakwater.

No work of any consequence has been done on this pier this year; it is in fair condition. Like all this kind of structures a good deal of labor could be laid out on it to advantage.

NAVIGATION OF 1884.

A break occurred on the morning of June 25th just east of the Palmyra aqueduct, which carried away the berme bank for some distance from that structure and washed out the bottom of the canal for about 300 feet. A boat loaded with wheat was caught in the break, one end resting on the aqueduct; it was removed by burning it up, and the break repaired and navigation was fully resumed July 3d.

A small break occurred on October 29th on the Three-mile level which detained navigation only a few hours, however.

With these exceptions, although quite a number of heavy leaks have occurred and been stopped, no detention of navigation has occurred during this season's navigation thus far.

Buffalo Trunk Sewer.

The commissioners intrusted with this work have made good progress therewith. It will probably be completed by early spring, with the exception of the outlet into the Niagara river. The tunnel under the canal is completed; the contractors are now at work on that portion in the harbor which requires a coffer-dam, and which, owing to the depth of water, cannot be tunnelled, after completing which they will connect each end of a coffer-dam, which will run lengthwise the harbor, with the Bird Island pier; remove it and form the sewer outlet into the river, when they will replace the pier as to alignment with heavy stone work instead of cribs of timber filled with stone as at present.

This work is situate at Albany street.

To make the work complete, the dry-weather flow of the other large sewer of Buffalo, viz., that which now empties all its contents into the canal at Bird avenue, is to be brought along the rear of the towing-path in a four-feet brick sewer to the same tunnel at Albany street, where, mingling with the main trunk sewer, the contents of each will flow into the Niagara river.

Although but little more than the dry-weather flow is intended to be conveyed by these sewers into the river, it is to be hoped that they will have the desired effect of relieving the canal from the inordinate amount of sewage matter which now flows down its channel, and settling, forms such an obstruction to navigation in itself and furnishes a bed for the growth of aquatic plants, which still further interfere with the flow of the water, and which, even as far down as Middleport, has been a subject of complaint on account of its stench.

I have had the honor, at your request, of taking charge of the drainage of the State Asylum for the Insane, at Buffalo; reflooring the basements and laying a track for the conveyance of the food to the different wards.

It has been let and the work is now in progress.

This division has been under the charge of Thos. Evershed, as division engineer, during the past fiscal year.

I have the honor to be

Your obedient servant,

THOS. EVERSHED,
Division Engineer.

Statement giving names, rank, number of days and compensation of engineers upon the repairs of the Western Division of the New York State canals, with incidental expenses, during fiscal year ending September 30, 1884.

[Act, chap. 169, Laws of 1863.]

ERIE CANAL.

Repairs from Oct. 1, 1883, to Sept. 30, 1884.

	Amount.	Total.
Thos. Evershed, division engineer, 11-12ths of a year, salary \$2,400....	\$2,200 00	
Thos. Evershed, division engineer, expenses...	453 63	
Jno. Bisgood, resident engineer, 1-8 of a year, salary 2,000.....	250 00	
Jno. Bisgood, resident engineer, expenses.....	8 03	
Jno. Bisgood, assistant engineer, 250 days at \$5 per day.....	1,250 00	
Jno. Bisgood, assistant engineer, expenses.....	143 14	
W. N. Radenhurst, assistant engineer, 40 days at \$5 per day.....	200 00	
W. B. Sackett, leveler, 39 days at \$4.50 per day.	175 50	
W. B. Sackett, leveler, expenses.....	19 44	
M. W. Wilbur, rodman, 79 days at \$3.50 per day.....	276 50	
M. W. Wilbur, rodman, expenses.....	10 48	
M. W. Wilbur, chainman, 195 days at \$2.50 per day.....	487 50	
M. W. Wilbur, chainman, expenses.....	104 50	
A. Van De Mark, chainman, 88 days at \$2.50 per day.....	220 00	
A. Van De Mark, chainman, expenses.....	7 98	
	<hr/>	\$5,806 70
Stationery.....	\$53 57	
Fire, light and office rent.....	407 20	
Postage and telegraph.....	64 06	
Miscellaneous.....	21 92	
	<hr/>	546 75
Total.....		<hr/> <hr/> \$6,353 45

The following amount of work and travel has been done by the regular engineering force on this division, outside of their regular duties, on ordinary repairs during the last fiscal year.

	Amount.	Total.
T. Evershed, division engineer, 1-12th the year, salary \$2,400.....	\$200 00	
T. Evershed, division engineer, expenses.....	33 93	
John Bisgood, assistant engineer, 25 days at \$5 per day.....	125 00	
John Bisgood, assistant engineer, expenses....	26 42	

	Amount.	Total.
M. W. Wilbur, chainman, 40 days at \$2.50 per day.....	\$100 00	
M. W. Wilbur, chainman, expenses	36 07	
	<hr/>	
Total.....		<hr/> \$521 42 <hr/>

Report on the work done pursuant to a concurrent resolution of the Legislature relative to the establishment of bench marks to fix and determine the level on Cayuga and Cross lakes.

The resolution is as follows :

WHEREAS, Several embankments have been made across the outlet of Cayuga lake and the channel of Seneca river, by the State, railroad companies, and public and incorporated bridge companies ; and

WHEREAS, There are no established levels or marks to determine the effect from year to year of these works upon the relative water level of Cayuga lake and its outlet.

Resolved (if the Assembly concur), That the State Engineer be and he is hereby directed to run a line of continuous levels from Cayuga lake to Cross lake, establishing bench marks at high water-mark along the line of said levels as follows :

Bench-mark No. 1 to be established at high-water mark on the lower mitre-sill of the lock at the entrance to the Cayuga branch of the Cayuga and Seneca canals which show the level of the Cayuga lake.

Bench-mark No. 2 shall be established at high-water mark on the lower mitre-sill of what is known as mud lock at junction of the Seneca branch, with the Cayuga branch of said canals.

Bench-mark No. 3 shall be established at high-water mark on the central pier of the Erie canal aqueduct at the crossing of the Seneca river.

Bench-mark No. 4 shall be established at high-water mark at the central pier of the crossing of the New York, West Shore and Buffalo railroad.

Bench-mark No. 5 shall be established at high-water mark on the central pier of the New York Central and Hudson River railroad companies' crossing.

Bench-mark No. 6 shall be established at high-water mark at the cut through Musquito point bar.

Bench-mark No. 7 shall be established at high-water mark at the water level of Cross lake at a suitable place in the discretion of the engineer in charge.

All of the above bench-marks shall be established at high-water mark and marked on the map of the outlet of the Cayuga lake; and in the channel of Seneca river so that they may be easily found and noted by an expert in engineering. Said map is now on file in the office of the State Engineer.

It shall be the duty of the State Engineer, three times in each year, namely during the first ten days of each March, August and December, to detail an engineer to examine and report to his office the relative condition of the water-level as compared with the above established benches.

Also to report upon the actual depth of water at the point where these bench-marks are established.

Also to take the actual water-level at the point each side of the Erie canal embankment where the old channel of the Canandaigua or Clyde river is crossed by said embankment. The result of the above levels and measurements shall be published annually in the report of the State Engineer to the Legislature, and in the event that the Department of the State Engineer shall be abolished or absorbed by any other department, the duties above detailed shall be performed by the department succeeding to that of the State Engineer.

The work of carrying out these requirements of the Legislature was intrusted to Denison Richmond, division engineer of the middle division of the State canals, who makes the following report:

The foregoing resolution requires the bench marks to be established at high-water mark, and at the same time, in most cases, designates the particular places where they shall be made. To fulfill these requirements literally was found to be impossible, but the benches as now established will furnish all the data required by the resolutions. The values given at these benches refer to the base or datum line established by Hon. George Geddes in 1851. This course was adopted, as testimony given by canal engineers since that time before the Board of Appraisers, was based on the values of benches derived from said base. While all future records and water profiles can hereafter, on this basis, be more readily connected and compared with those on file, the datum line referred to was made 8 $\frac{137}{1000}$ feet above the surface of Cayuga lake, as found October 1, 1851, and at that time established by three benches cut in the face of the rock at Cayuga. In State Engineer's report for the fiscal year ending September 30, 1862, page 357.


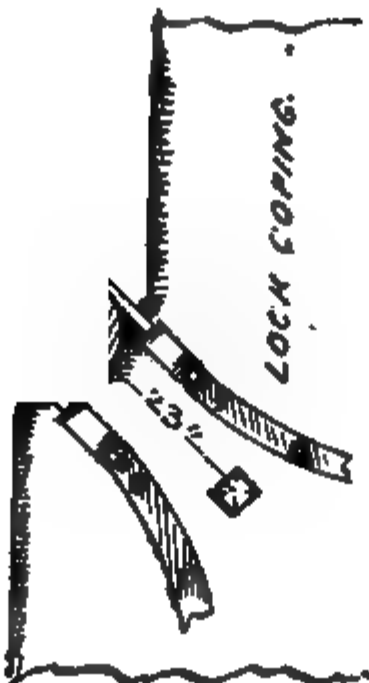
These benches, owing to the disintegration of the rock, are now obliterated; but in 1862, other benches along the river were established from these by Howard Soule, Jr., and were used in connection with the present line of continuous levels. The bench on the Montezuma aqueduct was in the best state of preservation and the most permanent, being in a position least liable to disturbance by frost or accident. This was therefore made the connecting bench, although the variations at some of the other benches were so slight as to have made no practical difference which was selected. Great care was observed in running the original line of levels; but to prove the work a test was made, the result of which was most satisfactory. The entire work, including test, required about fifty miles of careful leveling, and was done without the employment of extra help. It involved considerable time and expense, and to take the required measurements three times each year will take about nine days, as the points are so widely separated and difficult to reach.

Following is a description of the benches which are also marked and graphically described on the map indicated in the resolution. I have also appended a table showing measurements to date as required, and also the principal data bearing upon the subject compiled from the records in this office and reduced to the common base as adopted. These were prepared by Mr. D. E. Whitford, who was in charge of the work done under the appropriation of 1872 and 1873, and is

therefore familiar with the old benches and the records of high and low water for the past ten years.

Bench marks established in 1884 between Cayuga and Cross lakes in accordance with a concurrent resolution of the Legislature.

These bench marks refer to the datum line established by Hon. George Geddes in 1851.

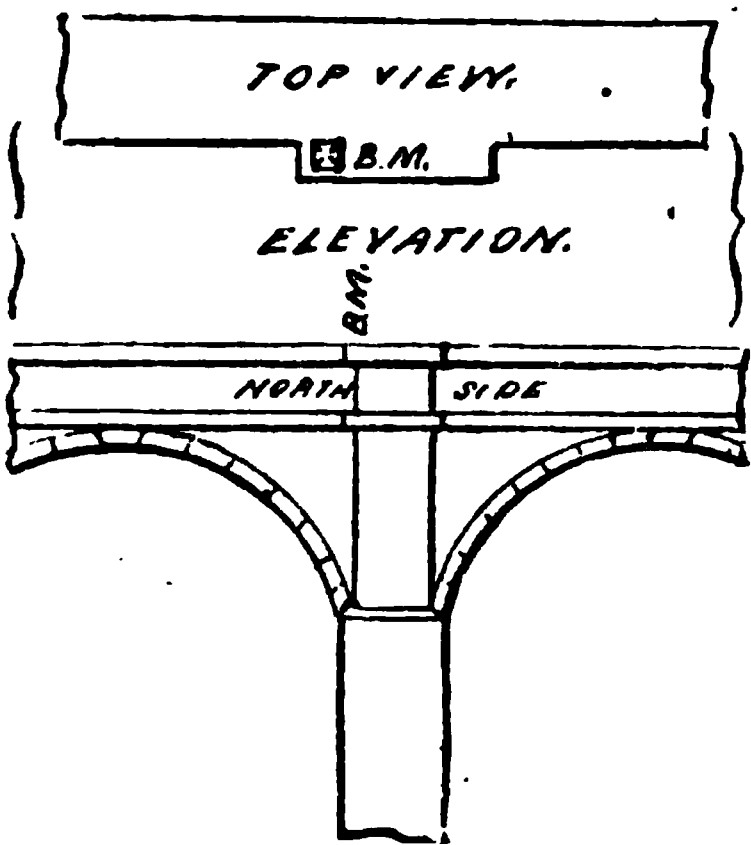
Value.	Location sketch.	Description.
No. 1. —0 008		On coping between the anchor irons, six and one-half inches from the T. P. or west lower hollow quoin, Cayuga lock.
No. 2. —0.234		On coping between the anchor irons, 23 inches from the berme or south lower hollow quoin, East Mud lock.

Value.

Location sketch.

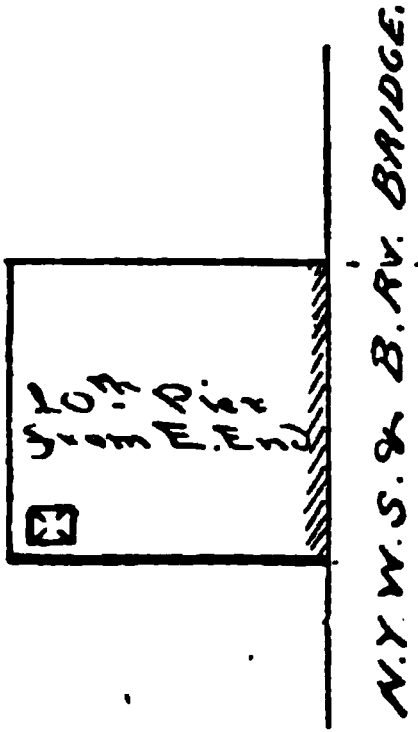
Description.

No. 3.
+6.049



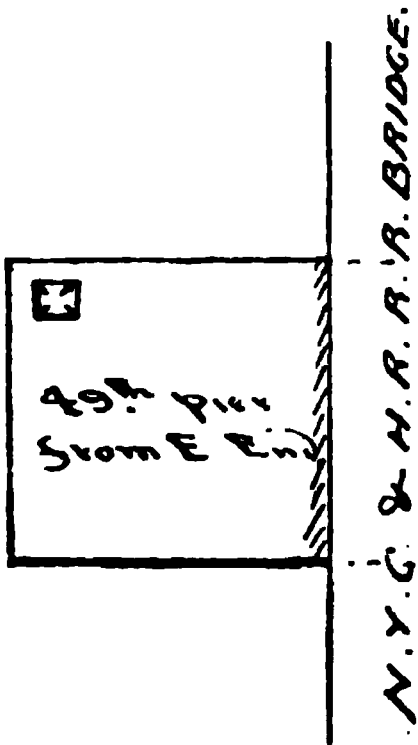
On coping of parapet wall, N. E. corner of projection, over 15th pier from east end, Seneca river aqueduct.

No. 4.
-4.799



S. E. corner, coping, 10th pier from east end, New York, West Shore & Buffalo R. R. bridge.

No. 5.
-4.687



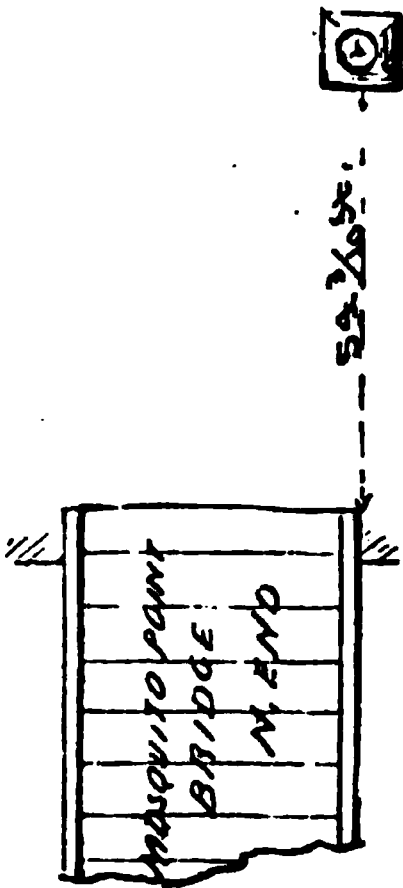
S. W. corner, coping, 49th pier from east end, south track, New York Central & Hudson R. R. bridge.

Value.

Location sketch.

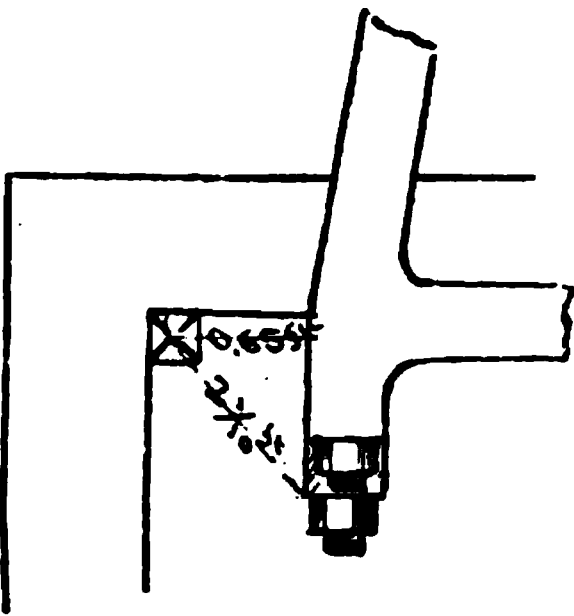
Description.

No. 6.
—0.336



Centre of gray lime-
stone monument, E. side
of highway, $54\frac{3}{10}$ feet
northerly from northeast
corner, and in line with
E. side of Mosquito Point
bridge.

No. 7.
—6.059



West corner of stone,
supporting south end of
west truss, $\frac{65}{100}$ of a foot
from side, and $2\frac{1}{10}$ feet
from end of truss casting,
iron road bridge, one mile
west of Cross lake.

Water record of Cayuga and Cross lakes and Seneca river, as per concurrent resolution, 1884.
[Water surface given below datum line.]

LOCATION.	Bench mark. No.	Miles from Cay- uga.	August 5th, 6th and 7th.		December 2d, 3d, and 4th.		REMARKS.
			Water.		Water.		
			Surface.	Depth.	Surface.	Depth.	
Cayuga lake.....	1	....	—8.59	10.49	—10.11	8.97	Depth on lower mitre-sill.
Mad lock.....	2	1½	8.80	10.42	10.22	9.00	Depth on lower mitre-sill.
Erie canal aqueduct.	3	6½	11.42	7.08	12.98	5.47	Depth on aque't foundation.
Canandaigua river, south of Erie canal.	....	6½	11.20	5.60	12.86	4.00	Depth of river.
Canandaigua river, north of Erie canal.	....	6½	11.58	5.40	18.01	4.00	Depth of river.
N. Y., W. S. & B. R. R. crossing.....	4	9	11.85	8.75	18.20	2.40	Depth on natu'l bed of river.
				7.80	.....	6.50	Depth in chan- nel dredged.
N. Y. C. & H. R. R. R. crossing.....	5	10	12.41	4.80	14.19	8.00	Depth on bridge foundation.
Mosquito Point	6	15¼	15.92	0.10	16.81	Bed dry.	Depth on natu'l bed of river.
				7.20	.....	6.80	Depth in chan- nel dredged.
Cross lake.....	7	25	17.82	19.20	17.55	19.00	Depth at iron bridge.

Water record of Cayuga and Seneca lakes and Seneca river, compiled from records in Division Engineer's office at Syracuse, N. Y. (December, 1884.)
[Water surface given below datum line established by Geddes in 1851.]

LOCATION.	Miles from Cayuga lock.	October 1, 1851.	August 25 and 26, 1862.	Highest water known.		May 25, 26 and 27, 1875.
				March 19, 1865.	April 10 and 11, 1873.	
Cayuga lake.....	.....	—8.14	—7.08	—2.70	—2.71	—9.26
Mad lock at T. { up-stream side.....	.....	8.81	7.16	8.28	2.62	.....
P. bridge.... { down-stream side..	1½	.....	.....	.....	2.79	.....
Seneca River { up-stream side.....	.....	.....	.....	8.78.	8.89	.....
aqueduct.... { down-stream side..	6½	10.78	10.76	.....	.....	11.58
Canandaigua river, south of Erie canal.....	6½	.....	.....	8.87	8.49	.....
Canandaigua river, north of Erie canal.....	6½	.....	.....	8.58	8.20	.....
N. Y. C. & H. R. R. R. crossing....	10	11.80	12.12	4.11	8.55	.....
Mosquito Point. { head of bar.....	.....	12.63	14.20	.....	8.81	12.69
{ at bridge.....	15¼	.....	.....	.....	8.94	.....
{ foot of bar.....	.....	18.12	14.78	.....	4.08	15.00
Cross lake.....	25	18.98	17.95	.....	6.09	15.93

REPORT

OF ENGINEERING DEPARTMENT, HUDSON RIVER IMPROVEMENT, 1884.

ALBANY, Dec. 24, 1884.

Hon. E. SWEET, *State Engineer and Surveyor*:

SIR. — I would respectfully submit the following report of the work done by the Hudson River Improvement Engineering Department for the current year:

The engineers of this department were called upon very early the present season by reason of a large shoal formed in the channel of the river at the overslaugh bar which demanded immediate attention, it entirely preventing navigation at mean low water, from which bar 42,703.82 cubic yards of material was removed before the subsiding of the spring freshets, by Messrs. Myres, Payne and Seward, contractors, with whom contracts were entered into by the Superintendent of Public Works. After the completion of the above work, a general reconnaissance of the channel from below New Baltimore to the upper bridge at Troy, by actual soundings and more careful surveys, was made of the following bars and shoals, viz., as follows:

- 1st. Below New Baltimore near the mouth of Schodack creek.
- 2d. Mulls Light shoal.
- 3d. Final at Bogart Light or Overslaugh Bar.
- 4th. Round Shoals.
- 5th. Lower end of the Albany Pier.
- 6th. Bath.
- 7th. Fish House Shoal.
- 8th. Hotaling's Ice House.
- 9th. The cross over between Cuyler and Overslaugh Bars.
- 10th. Middle railroad bridge at Albany.
- 11th. Esopus creek at Saugerties.
- 12th. Van Buren bar at Steel Works, Troy.
- 13th. Troy.
- 14th. Final at Fish House shoal.
- 15th. Final at Round shoals.
- 16th. Final at Esopus creek at Saugerties.

Also tidal experiments made at Albany to determine the action of the ebb and flood tides which for a more detailed report I would refer you to the maps, on file in your office, from the results of these surveys. The following contracts were entered into by the Superintendent of Public Works, viz.: Dredging the channel at Fish House shoal with P. W. Myres, contractor for 10,000 cubic yards, more or less (estimated), at fifteen cents per cubic yard, from which 13,993.91 cubic yards of material was removed; Round shoals with P. W. Myres, con-

tractor for 28,000 cubic yards, more or less (estimated), at seventeen cents per cubic yard, from which 30,068.40 cubic yards of material was removed. Also for Esopus creek at Saugerties with E. R. Seward, contractor, 25,000 cubic yards, more or less (estimated), at eight and three-fourth cents per cubic yard, from which 29,131 cubic yards of material was removed. Considerable work was also done by State Dredge No. 2, on the Overslaugh at the end of the Albany Pier, at Troy, and in taking out a sunken boat at nine mile tree, in all about thirty-seven days, which work was not of sufficient magnitude to warrant the letting of contract for, and which was paid for by the number of hours' service actually performed. I would respectfully call your attention to the extremely low prices for which all the contracts were taken the past year, and though the Hudson River Improvement Fund shows a balance of \$8,524.97 that if taken in comparison with prices for which the same class of work has been done in former years, would show a deficit, and as the several bars or shoals of the Hudson river accumulate steadily and require constant attention to preserve navigation, it would be unwise to recommend a decreased appropriation for its improvement. I would also submit to you the engineering expenses for the past season amounting to \$3,484.32 which for detail, I would refer you to the accompanying statement.

Yours respectfully,

CHAS. G. WITBECK,

*Asst. Engineer in charge of the
Hudson River Improvement.*

Report of Disbursements by the Engineering Department of the Hudson River Improvement for the year 1884.

MONTH.	Salary of corps.	Travel and hotel exp'ses.	Office expenses.	Material.	Labor.	Wages of boatmen.	Use of small boats.	Tug hire.	Total.
April	\$158 50	\$4 00	\$29 88	\$9 82	.....	.....	\$3 63	\$75 00	\$280 83
May	351 00	42 74	20 17	13 34	.....	\$41 00	28 69	6 25	503 19
June.....	349 00	2 83	3 56	2 42	.....	32 00	13 00	.....	403 31
July	445 50	5 75	.....	16 22	.....	26 00	13 00	.....	506 47
August.....	355 50	57 42	7 94	1 25	\$10 00	46 00	22 00	.....	500 11
September.....	338 00	22 48	.....	80	.....	10 50	4 00	.....	375 78
October	351 00	12 45	.....	.....	.....	20 00	12 00	5 00	400 75
November	237 50	.....	.....	.....	.....	.....	.....	.....	237 50
December	199 50	20 69	*17 74	.....	29 00	8 25	2 00	.....	277 18
Total	\$2,785 50	\$168 36	\$79 29	\$43 85	\$39 00	\$183 75	\$98 32	\$86 25	\$3,484 32

Printing in 1882.



STATE OF NEW YORK.

No. 39.

IN ASSEMBLY.

JANUARY 26, 1885.

ANNUAL REPORT

OF THE INEBRIATE HOME FOR KINGS COUNTY.

To the Honorable the Legislature of the State of New York:

In accordance with the provisions of our charter (chapter 483, section 11, of the laws of 1868), I have the honor to submit the Annual Report of the Inebriate Home for Kings county, for the year ending December 31, 1884.

There were remaining in the home January 1, 1884, 127 patients; there were admitted 344; making a total of 471.

On the 31st of December, 1884, there were 134 patients remaining in the institution, viz., 53 boarders and 81 indigent poor.

During the year 4 patients have died in the home; 2 were transferred to hospitals and 3 to the lunatic asylum; 328 left during the year; 139 of these are engaged in business and doing well; 49 unimproved; 78 have been lost sight of; 55 were re-admissions; 7 have died since leaving the institution.

The following table shows the monthly number of patients for the year 1884.

January.....	153	July.....	172
February.....	151	August.....	164
March.....	156	September.....	165
April.....	160	October.....	155
May.....	158	November.....	151
June.....	166	December.....	146

SOCIAL CONDITION.

Male.

Married	213	
Widower	23	
Single	175	
	<hr/>	408

Females.

Married.....	50	
Widows.....	11	
Single.....	2	
	<hr/>	63

Grand total 471

NATIVITY.

United States.....	329	Scotland.....	9
Ireland.....	89	Germany.....	13
France.....	1	Elsewhere.....	3
British Provinces.....	9		
England.....	18	Total.....	471

OCCUPATION OF MALES.

Accountant.....	1	Cotton buyer.....	1
Actor.....	1	Dock-builders.....	2
Agents, commission.....	2	Druggists.....	5
Agents, insurance.....	2	Engineers.....	5
Agents, real estate.....	2	Engineers, Civil.....	5
Architect.....	1	Engravers.....	2
Artists.....	4	Farmers.....	3
Bakers.....	2	Firemen.....	3
Bartenders.....	5	Gardener.....	1
Blacksmiths.....	3	Gilder.....	1
Book-keepers.....	8	Glass worker.....	1
Bookbinders.....	3	Grocers.....	5
Book publisher.....	1	Hatters.....	2
Brass worker.....	1	Hotel-keepers.....	3
Bricklayer.....	2	Ice cream dealers.....	1
Brokers.....	7	Icemen.....	2
Builders.....	3	Inspectors.....	2
Butchers.....	6	Janitors.....	3
Carpenters, house.....	10	Jewellers.....	2
Carpenters, ship.....	2	Journalists.....	4
Cartmen.....	4	Label cutter.....	1
Chemist.....	1	Laborers.....	17
Clerks.....	60	Lather.....	1
Coachmen.....	2	Lawyers.....	16
Conductors.....	2	Liquor dealers.....	4
Contractors.....	2	Longshoreman.....	1
Cooks.....	4	Machinists.....	2
Coopers.....	2	Manufacturers.....	2

OCCUPATION OF MALES — *Continued.*

Marble polisher.....	1	Roofers.....	1
Marketmen.....	2	Sailor.....	3
Mason.....	1	Salesmen.....	12
Merchants.....	26	Shade painter..	1
Milkman.....	1	Shoemakers.....	5
Musician.....	1	Showman.....	1
Naval officer.....	1	Stevedore.....	1
No occupation.....	23	Stone cutters.....	3
Painter.....	12	Student, denistry.....	1
Paper dealer.....	1	Student, law.....	1
Paper rulers.....	1	Students, medical.....	3
Paper stainer.....	1	Surveyors.....	2
Photographers.....	5	Tailors.....	6
Physicians.....	8	Teachers.....	2
Pilot.....	1	Teamsters.....	4
Plasterers.....	7	Tinsmiths.....	5
Plumbers.....	5	Towboy.....	1
Porter.....	1	Undertaker.....	1
Pressman.....	1	Warehousemen.....	2
Printers.....	7	Watchcase-makers.....	2
Purser.....	1		
Railroad employees.....	2	Total.....	408
Reporters.....	2		

OCCUPATION OF FEMALES.

Domestic.....	12	Shoe fitter.....	1
Housekeepers.....	13	Shoe operator.....	1
No occupation.....	35		
Opera singer.....	1	Total.....	63

APPROXIMATION OF AGES.

Under 20 years.....	2	From 50 to 60 years.....	64
From 20 to 30 years.....	87	From 60 to 70 years.....	11
From 30 to 40 years.....	166		
From 40 to 50 years.....	141	Total.....	471

The oldest patient was seventy years; and the youngest patient was 19 years.

By a comparison of the statistics of this year with those of 1883, it appears that there were a less number under treatment, but the average time of stay was somewhat lengthened. The number of re-admissions was considerably lessened, which in itself is a great gain, as the re-admissions usually consist of those coming and remaining but a short time, simply to recuperate and with no intention to reform.

To such a class but little permanent good can be done, and they are very objectionable people to have as associates for others.

With the present capacity of the building the longer each remain, the less the number that can be accommodated, as the institution has

been filled to its utmost capacity during the whole year, and admission could only be obtained by waiting for a vacancy to occur.

The trustees have already made arrangements to enlarge the building, which will probably be completed by spring, thus considerably increasing the capacity of the institution for the care and maintenance of free patients.

The usefulness and necessity of this institution is thus abundantly proven — its reputation is now world wide, and it draws its inmates from all parts of the United States, and also from Europe, and we believe that to-day it is the best institution of its kind existing.

The necessity for such hospitals is now generally acknowledged and it is stated by the best authorities, that at least thirty-eight per cent of all cases of inebriety that come under treatment in Inebriate Asylums are cured.

Inebriate hospitals have demonstrated some facts at least which can not be gainsaid, many intemperate men who have entered them voluntarily and conformed to their teachings, have gone forth to the world stronger and better than before, and are still pursuing sober and useful lives, in at least the proportion as stated. One man out of three has been saved, and this against strong adverse circumstances in most cases.

It has been shown also that there are not a few cases of incurable inebriates, which may remain quietly and soberly within an institution for years together, and thus shield themselves from risk of debauch and their families from annoyance and danger.

It has also been proven that inebriate asylums are a constant rebuke and warning to the people on the subject, which has a deterrent influence in favor of temperance.

These facts taken together with the fact that inebriate asylums and homes record about a third of their cases restored, and that public sentiment is strengthening every day in favor of sobriety, there should be no discouragement from any quarter, nor rivalry between different methods, other than that which is borne of high purpose and earnest effort to accomplish the most good for the individual and the general public.

All of which is respectfully submitted,

G. G. HERMAN,

President.

FORT HAMILTON, *January* , 1885.

Annexed is the report of the treasurer for the year ending *December* 31, 1884.

TREASURER'S REPORT.

The following is the Report of the Treasurer of the Inebriate Home for Kings' County for the year ending December 31, 1884.

RECEIPTS.

From board money.....	\$34,680 15
From comptroller of the city of Brooklyn.....	39,907 50
From county towns per excise commissioners.....	1,924 63
From rent.....	40 00
	<hr/>
	\$76,552 28
	<hr/>

DISBURSEMENTS.

Maintenance.

Paid for groceries and provisions.....	\$33,633 17
Paid for coal, wood, astral oil and gasoline.....	4,876 51
Paid for medicine, surgical instruments and attendance in medical department.....	1,618 67
Paid for clothing.....	1,607 21
Paid for expressage, cartage, farm, etc.....	1,994 01
Paid for help and labor.....	2,447 68
Paid for advertising, printing and stationery.....	1,054 23
Paid for newspapers and periodicals.....	116 26
Paid for incidental expenses.....	226 46
Paid for salaries of officers.....	4,816 76
Paid for rent of office.....	480 00
Paid for insurance.....	389 17
	<hr/>
	\$53,260 13

Buildings and Improvements.

Paid for furnishing furniture, etc.....	3,113 81
Paid for building, repairs and improvements.....	8,957 30
Balance paid on account of indebtedness.....	11,221 04
	<hr/>
	\$76,552 28
	<hr/>

WM. M. THOMAS.

Treasurer.

Examined and found to be correct.

J. W. RICHARDSON, *Auditor.*

FORT HAMILTON, *January* , 1885.

STATE OF NEW YORK.

No. 40.

IN ASSEMBLY,

JANUARY 27, 1885.

ANNUAL REPORT

OF THE TRUSTEES OF THE COOPER UNION FOR THE
ADVANCEMENT OF SCIENCE AND ART.

STATE OF NEW YORK:

EXECUTIVE CHAMBER,
ALBANY, *January 27, 1885.* }

To the Legislature:

I have the honor to transmit herewith the Annual Financial Report of the Cooper Union for the Advancement of Science and Art for the year 1884.

DAVID B. HILL,
Governor.

[Assem. Doc. No. 40.]

REPORT.

To the Legislature of the State of New York. :

The Trustees of the Cooper Union for the Advancement of Science and Art, as required by the charters, submit the following report of the receipts and expenditures of the corporation for the year ending December 31, 1884.

RECEIPTS.

Rent from stores, rooms and offices.....	\$29,648 15
Large hall.....	2,866 00
Miscellaneous receipts.....	2,538 20
Interest on town of Pompton bonds.....	15,750 00
Interest on Long Island railroad bonds.....	550 00
Interest on Peter Cooper endowment fund.....	4,500 00
Donations.....	250 00
	<hr/>
	\$56,102 35

EXPENDITURES.

For free night classes.....	\$10,381 42
For free art school for women.....	10,758 93
For free reading room.....	2,001 14
For free library.....	5,317 02
For chemical department.....	175 16
For laboratory.....	401 92
For lecture expenses.....	815 27
For care of building.....	7,034 11
For heat and ventilation.....	5,361 38
For repairs and improvements.....	2,234 26
For office expenses.....	647 00
For stationery.....	364 16
For printing.....	729 67
For postage.....	114 50
For rewards to employees.....	250 00
For women's centennial union fund.....	108 00
For gas.....	5,327 75
For advertising.....	9 20
For sundries.....	193 84
	<hr/>
	\$52,224 73

GENERAL CASH STATEMENT.

Dr.

Balance in treasury, January 1, 1885.	\$3,231 36
Receipts.....	56,102 35
Money borrowed.....	11,000 00
	<hr/>
	\$70,333 71
	<hr/>

Cr.

Expenditures.....	\$52,224 73
Loans paid off.....	11,000 00
Balance in treasury, January 1, 1885.....	7,108 98
	<hr/>
	\$70,333 71
	<hr/>

FINANCIAL CONDITION.

Current Assets.

Balance in treasury, January 1, 1885.....	\$7,108 98
Rents due.....	4,325 01
	<hr/>
	\$11,433 99
	<hr/>

CURRENT INDEBTEDNESS.

Loans.....	\$12,200 00
Accounts audited.....	6,488 51
	<hr/>
	\$18,688 51
	<hr/>

In addition to the current receipts above stated, the trustees have received from the executors of the estate of Peter Cooper, deceased, one hundred and fifty thousand dollars which has been invested in securities as an endowment fund. The trustees have also received fifteen thousand dollars from the township of Pompton, on the principal of the bonds held by them as an endowment fund.

City and County of New York, ss.: WILSON G. HUNT, DANIEL F. TIEMANN, EDWARD COOPER, JOHN E. PARSONS and ABRAM S. HEWITT, being duly and severally sworn, do, and each for himself doth depose and say, that they are Trustees of the Cooper Union for the Advancement of Science and Art, and that the foregoing is a true account of all the receipts and expenditures of the said trustees for the year ending December 31, 1884, to the best of their knowledge and belief.

WILSON G. HUNT,
DANIEL F. TIEMANN,
EDWARD COOPER,
JOHN E. PARSONS.

Sworn to, before me, this }
26th day of January, 1885. }

[SEAL.]

DANIEL R. GARDNER,
Notary Public (24), City and County of New York.

STATE OF NEW YORK.

No. 41.

IN ASSEMBLY,

JANUARY 28, 1885.

ANNUAL REPORT

OF THE NEW YORK STATE SOLDIERS AND SAILORS'
HOME, FOR THE YEAR ENDING SEPTEMBER 30, 1884.

NEW YORK STATE SOLDIERS AND SAILORS' HOME, }
BATH, N. Y., *November 13, 1884.* }

To the Legislature :

The following annual report of the operations, receipts and expenditures of the New York State Soldiers and Sailors' Home, for the year ending September 30, 1884, is respectfully submitted.

The total number of inmates at the close of the year was 700, of whom 593 were present. The average number present during the year was 576.

The cost of the purchased ration was 18½ cents per day. The cost of clothing was \$15⁵⁸/₁₀₀ per man for the year.

The last Legislature appropriated \$50,000 for additional buildings for the accommodation of 400 additional inmates.

The number of applications for admission now pending indicates that these buildings will be filled as soon as completed.

The increased number of inmates now present and cost of furniture for the new buildings renders an additional appropriation for the year ending September 30, 1885, of \$20,000.

We respectfully recommend an appropriation of \$105,746, for the ensuing year for the support of 800 men, with ordinary repairs and improvements.

We append hereto, as part of our report, a detailed statement of the superintendent, surgeon, and quartermaster of the Home.

[Assem. Doc. No. 41.]

We take pleasure in saying that in our judgment the Home is exceedingly well conducted, and that the superintendent and other officers are entitled to great credit.

Respectfully submitted,

H. W. SLOCUM,
JNO. PALMER,
O. B. CADWELL,
JONATHAN ROBIE,
WM. E. HOWELL,
J. F. QUINBY,
WM. F. ROGERS.

STATE OF NEW YORK, }
County of Steuben, } ss. :

Henry W. Slocum, president, and Jonathan Robie, treasurer of the New York State Soldiers and Sailors' Home, being severally duly sworn, depose and say that the foregoing statements are true.

H. W. SLOCUM,
President.
JONATHAN ROBIE,
Treasurer.

Subscribed and sworn before me, this }
13th day of November, 1884. }

R. H. GANSEVOORT, *Notary Public.*

REPORT.

NEW YORK STATE SOLDIERS AND SAILORS' HOME, }
BATH, N. Y., *November, 1884.* }

To the Hon. Board of Trustees, New York State Soldiers and Sailors' Home :

GENTLEMEN — I have the honor to submit the following report of the Home for the year commencing October 1, 1883, and ending September 30, 1884, viz.:

The year has been one of unusual peace and quiet, no complaints of a serious character having reached the superintendent, and nothing having occurred during the year to break the monotony which characterizes the life of the inmates here. They are apparently as contented as men can be, with plenty to eat, a good shelter, and no regular occupation.

There has been no change in the officers of the institution since last report, which consists of a superintendent, surgeon, adjutant (assistant to superintendent), and steward and purveyor.

Number of inmates present at last report, September 30, 1883.....	521
Number present and absent, September 30, 1883.....	659

CHANGES SINCE LAST REPORT.

Gain.

Number admitted.....	299
Number re-admitted.....	93
Total gain.....	392

Loss.

Number died.....	61
Number discharged on their own application.....	160
Number summarily discharged.....	59
Number dropped.....	71
Total loss.....	351

Net gain.....	41
Total present September 30, 1884.....	593
Total present and absent September 30, 1884.....	700

Average number present during the year ending September 30, 1884.....	576
Average number present during the year ending September 30, 1883.....	510
Excess of year 1883 and 1884, over that of 1882 and 1883.....	66
Least number present during the year.....	485
Greatest number present during the year.....	643

In addition to the foregoing 44 men have received temporary aid.

I append herewith a list of all men who have been registered as admitted to the Home from its organization, to 30th of September, 1884, showing the average age, length of service and nativity. From this list it will be seen that up to the date mentioned above, 2105 men have been admitted to the Home.

The gradual increase of the number applying for admission to the Home, and the experience of the winters of 1883 and 1884, when the buildings were overcrowded, and many were refused admission, demonstrating beyond all question the necessity for more room, the board at its meeting of February 11, 1884, appointed trustees Robie Palmer and Rockwell a committee "to prepare for the Legislature a statement of the needs and requirements of increased accommodation at the Home;" and at their instance, a bill for that purpose was introduced to the Legislature, appropriating \$50,000 for "additional buildings, sufficient to accommodate at least 300 men." This was finally passed near the close of the session, but did not become a law until June. At the meeting of the board of the 21st of June, the subject was brought up.

Mr. Walter Dixon, of Albany, and Mr. A. J. Warner, of Rochester, appeared before the board with plans.

The plans of Mr. Dixon were preferred, and he was directed to prepare plans in detail, to be submitted to the committee on buildings and grounds, to which Captain Palmer was added. Subsequently on the 17th of July the committee met in Albany, and having approved Mr. Dixon's plans, invited sealed proposals for the erection of the buildings, to be opened August 6, to which time the committee adjourned. They met at that date at head-quarters, and proceeded to open the bids. Six bids were received for the construction of the addition to the hospital, boiler-house and barrack buildings. The highest being \$58,674, and the lowest \$37,390 being that of Messrs. Allington & Gerity, to whom the contract was awarded.

Four bids were received for steam heating, gas and fixtures, water and sewerage, the highest \$9,667, and the lowest \$6,700, that of E. J. Cook & Company, limited, to whom the contract was awarded.

A contract, with the security required by the committee for the faithful performance of the same, was entered into with the aforementioned parties, which, with the plans and specifications of the architect, were subsequently submitted to the Comptroller, and by him approved.

Ground was broken on the addition to hospital about the 20th of August, and I am able to report at this date, November 13, the hospital addition about ready for occupancy, the addition to the boiler-house completed, and the boilers in place, and the walls of the barrack build-

ing up, and ready for the roof. It is calculated that this addition to the Home, when completed, will make comfortable accommodation for 1,000 men.

INTERNAL POLICE AND DISCIPLINE.

The inmates, as the members of the board are aware, are organized into three companies, A, B and C, A company occupying one of the dormitory buildings. Each company has its complement of non-commissioned officers, viz.: first sergeant, who has the general charge of the company, assisted by a corporal on each floor, who is responsible for the good order and police of the floor.

These non-commissioned officers are selected from the inmates, and their positions are any thing but desirable, and difficult to fill with suitable men. The most thorough police of the quarters and surroundings is enjoined and maintained, and every effort made to impress upon the inmates the importance of personal cleanliness, for which they are liberally provided with every facility. As a body the conduct of the inmates has been good, disorders of a grave character being rare. As I have said in a former report, their general conduct and cheerful obedience to orders, and observance of the few restrictions upon their present liberties, will compare favorably with that of any garrison of regular troops I ever served with.

RELIGIOUS SERVICES.

Religious services have been conducted during the year, in the afternoon on Sundays, by the ministers of the different denominations of the village alternating with each other. It is believed that this is more satisfactory than to have a regular chaplain. In this connection I beg to ask your attention to the necessity for a chapel. The present room, used as such, will only seat 225, is inaccessible to the infirm, and is wanted very much for a reading-room. The room used at present for a reading-room is too small for the purpose, and could be utilized to great advantage for the library, which is very much crowded.

SANITARY CONDITION.

The sanitary condition is all that good food, and clothing, careful police, and an abundant supply of pure water for all purposes, good ventilation and thorough sewerage can make it.

Sixty-one deaths have occurred during the year, fifty-eight in the hospital and three absent, but borne on the rolls of the Home.

The hospital is complete in all its appurtenances and the medical attendance all that can be desired. The further details I respectfully ask your attention to the surgeon's report herewith appended.

INSANE.

Notwithstanding the most careful scrutiny of applicants' papers, an insane man, or a man who develops insanity after entering, will get in.

At this date, the Home is supporting one insane man at the Buffalo Asylum, and twelve at the Willard Asylum, at cost last year of \$1,541.06.

LIBRARY.

The library, which has been formed almost entirely by voluntary contributions, contains 3,556 bound volumes, and 442 miscellaneous magazines and pamphlets. During the year 7,500 volumes have been issued, with a loss of but one volume.

Adjoining the library is a comfortable reading-room, the tables of which are at present supplied with eleven daily and twenty-one weekly papers, English, and five daily and seven weekly, German. Most of the weekly papers are contributed by the publishers.

Since last report a valuable addition to the library, consisting of a handsome black walnut case, containing 182 new volumes, has been received from Captain M. A. Reed of New York, past commander of posts number 76, 80 and 143, G. A. R., an acknowledgement of which was made by the board.

BUILDINGS AND GROUNDS.

The grounds and buildings, gas, water-works, and steam-heating are all in good condition and repair.

In consequence of the outlay demanded for the actual maintenance of sixty more men than last year, no new improvements on the grounds have been commenced, and the propagating house, and new road directed to be constructed last year are in an unfinished condition.

The water supply has been abundant for all purposes, but without the additional supply afforded by the purchase of the Lang property, it would not have been; proving conclusively, if there was any doubt about it, the absolute necessity for that purchase.

CLOTHING AND PROVISIONS.

The inmates have been supplied during the year with an abundance of food. The beef and bread is of the best quality, while the groceries have been quite equal in quality to that usually found in family grocery stores. The variety of courses is limited, but care is had, to vary it, in its preparation, as much as possible.

The uniform is neat and comfortable, but the supply during the latter half of the year has been somewhat limited, in consequence of the greater number to be supplied than last year.

COST OF MAINTENANCE

The average cost of the purchased ration during the year was daily, 18½ cents; weekly, \$1.27½; yearly, \$66³¹/₁₀₀ *per capita*.

This low average is owing in a great measure to the abundant supply of vegetables furnished from the gardens.

The cost of clothing *per capita* was \$15⁵⁸/₁₀₀. The inmates are not permitted to take their clothing with them, when given a furlough, or on being discharged, but are required to turn it in. When its condition will justify, it is cleaned and pressed, and reissued as "worn clothing," but is not included in the cost above stated. During the year we have had, with what was on hand at the beginning of the

year, a large quantity of worn clothing for issue, but that supply has been exhausted, and we shall not be able to maintain these figures the present year.

Deducting the amount overdrawn last year, \$1,372.74, from \$80,000, the amount appropriated for the year, and adding to it \$108.45, the amount overdrawn this year, we have \$78,735.71, the actual cost of the Home during the year, and this amount divided by 576, the average number of men present, gives us as a total cost per man, \$136.69 $\frac{1}{4}$.

FARM AND GARDEN.

The vegetable garden has furnished the usual supply of fresh vegetables, while the farm has been equally productive, besides affording good pasturage during the season for the beef and milch herd.

A detailed statement of the receipts and cost is herewith annexed, from which it will be seen that the cost of running the farm and garden was \$2,744.34, and the net value of products, \$6,008.84, of which amount we credit the Lang farm with \$844.20. Amongst the items of productions I will only mention here 3,496 bushels of potatoes, 8,500 heads of cabbage, 615 bushels of onions, 265 bushels of wheat, 1,000 bushels of oats, 282 bushels of buckwheat.

I would ask your attention to a detailed statement appended to this report of Mr. C. C. Leavens, steward, of the receipts and expenditures on account of the farm and garden, also of commissary stores and clothing.

I would state that in the cost of the ration is included a monthly allowance of one pound of tobacco to each inmate, and as well the delicacies, and wine and spirits used in hospital.

FINANCES.

Maintenance, etc.

To amount appropriated for the fiscal year ending September 30, 1884.....	\$80,000 00
To amount received from sales to officers, employees and inmates.....	1,082 80
Total.....	\$81,082 80
By amount overdrawn for fiscal year ending September 30, 1883.....	\$1,372 47
By amount expended in first quarter.....	20,718 42
By amount expended in second quarter...	21,387 46
By amount expended in third quarter.....	21,627 48
By amount expended in fourth quarter...	16,085 42
Total expended.....	\$81,191 25
To amount overdrawn.....	108 45
	\$81,191 25

Additional Buildings.

To amount appropriated.....	\$50,000 00
By amount expended.....	61 89
	<hr/>
Amount unexpended.....	\$49,938 11
	<hr/>

Head-quarters, Hospital and Quarter-master's Storehouse.

To amount unexpended last year.....	\$472 12
By amount unexpended.	472 12
	<hr/>

Respectfully submitted,

T. G. PITCHER,

Superintendent.

SURGEON'S REPORT.

NEW YORK STATE SOLDIERS AND SAILORS' HOME, }
BATH, STEUBEN COUNTY, N. Y., }
SURGEON'S OFFICE, *October 1, 1884.* }

Gen. T. G. PITCHER, U. S. A., *Superintendent* :

SIR—I have the honor to submit herewith the following report relative to the working of the medical department at this Home for the year ending with the 30th of September last.

There were in hospital at the time of making my last annual report eighty patients. There have been admitted during the year 275. There have been discharged as cured or improved 153, and fifty-eight have died, remaining in hospital this date ninety-six patients.

During the year there have been compounded and put up for patients 20,826 prescriptions; of this number, 16,412 were for patients in hospital and 4,514 were for men in quarters, an average of nearly fifty-seven prescriptions for each day of the year.

Last fall, winter and spring there was unavoidable overcrowding in the hospital and quarters, and the inmates were somewhat older and more feeble, still the mortality at the Home has been less than during the previous year.

The number of deaths at the Home last year was sixty-three; this year the number is fifty-eight, two of the latter deaths occurring at Willard Asylum.

The names, ages, nativities and causes of death of patients who have died during the year will be found on schedules "A" and "B" hereto annexed.

But seven patients have suffered with erysipellas during the year, and those were mostly of a very mild type, against the twenty-three cases of that disease last year, of a malignant type, with one death.

While this disease was prevailing last year, the slightest wound would take on an erysipelalous inflammation; this year there has not been any such tendency.

There are present in hospital but four cases of insanity; three of the cases are quite mild and give us little trouble and can be as well cared for as at an asylum; the other case was but recently admitted, he is quiet days, requiring but little more care or watching than the other patients in his ward, but is very uneasy and sleepless nights and is getting worse, that it may become necessary to send him to an asy-

lum, why they have better facilities for the care and treatment of the insane, than this Home affords.

There has not been a single case of typhoid fever in this Home since I assumed the duties of surgeon, now over two and one-half years, nor am I able to learn that there has been a single case of that disease in the Home since it was opened, while Bath village, but two miles away, has hardly been at any time free from it during the past two years.

It is natural to ask why the Home escapes, while other places, apparently similarly situated, so severely suffer. The reasons in my opinion are to be found in the facts that the drinking water used here is free from impurities, the sewerage is the best that can be made, the ventilation of the hospital and quarters is as nearly perfect as can be, and that personal cleanliness, a large factor in the prevention of all diseases, is enforced here.

The same sanitary rules that prevail here, enforced in all the cities and villages of this land (if such a thing were possible), would in my opinion effectually guard them from the ravages of this disease.

The fact that for a period of about six years with a population of from 200 to 700, we have entirely escaped the ravages of typhoid fever, which is said to destroy the lives of about one out of five attacked, teaches a lesson that sanitarians may study with profit.

I think I can state with safety that all the deaths that have occurred here during the past year, with one exception, were but the culminations of diseases long since contracted elsewhere; many of the inmates only coming here to die and to be buried among their comrades.

The food of men in hospital has been good and substantial and in all respects what it should be for the class of patients here. The men seriously ill in almost all instances being fed chiefly on pure fresh milk and bread or milk and crackers, together with such delicacies as I might order, and which have been furnished in abundance.

In this connection it may not be improper to state that I have never been refused any articles of medicine or food, or any delicacy for the sick, that I deemed best for them; my requisitions being honored and the articles furnished as soon as practicable.

Before closing this report, allow me to call your attention to the very valuable services of Dr. F. A. Wygant, the accomplished hospital steward of this Home, who has so ably and efficiently seconded my efforts during the year.

In regard to my other assistants, I desire respectfully to call your attention to my recommendations at the close of my report of last year.

Respectfully,

J. S. DOLSON,

Surgeon.

SCHEDULE "A."

MORTUARY REPORT of the New York State Soldiers and Sailors' Home Hospital for the year ending September 30, 1884.

Number.	Name.	Age.	Nativity.	Date of death.	Disease.
1883.					
1	Anthony Smith	66	U. S. . . .	Oct. 6	Apoplexy.
2	Henry Baggenstoz . .	55	Germany	Oct. 11	Apoplexy.
3	P. Platt Williams . . .	55	U. S. . . .	Oct. 13	Suicide.
4	Edward Huggins . . .	60	Ireland .	Oct. 13	Chronic bronchitis.
5	P. P. Prime	82	U. S. . . .	Oct. 17	Apoplexy.
6	Julius Mast	64	Germany	Oct. 26	Phthisis pulmonary.
7	Christian Deigel . . .	70	Germany	Nov. 6	Paralysis and apoplexy.
8	James Crelly	37	U. S. . . .	Nov. 24	General dropsy.
9	Edward Hays	72	Ireland ..	Nov. 25	General dropsy and heart disease.
10	Edward Gross	49	U. S. . . .	Dec. 10	Congestion of brain and epilepsy.
11	John Agan	57	Ireland..	Dec. 16	General dropsy and heart disease.
12	George Miller	61	Germany	Dec. 30	Paralysis.
1884.					
13	Henry Casler	45	U. S. . . .	Jan. 4	Insanity.
14	Dennis Salters	47	Canada..	Jan. 9	Phthisis pulmonary.
15	Peter Greiner	71	Germany	Jan. 23	Hemiplegia and apoplexy
16	James Sickles	49	U. S. . . .	Jan. 30	Died at barracks.
17	George Hoppensack . .	70	Germany	Feb. 2	Apoplexy.
18	Hugh Patterson . . .	67	Ireland..	Feb. 4	Apoplexy.
19	Joseph Quigley	64	Ireland..	Feb. 5	Stricture and senility.
20	Henry Ostrum	89	U. S. . . .	Feb. 12	Old age.
21	William Bamberg . . .	70	Germany	Feb. 15	Bright's disease.
22	Philip O'Brien	63	Ireland..	Feb. 16	Asthma and heart disease.
23	John E. Beaton	44	U. S. . . .	Feb. 28	Chronic diarrhoea.
24	James S. Seebers . . .	45	U. S. . . .	Feb. 29	Lead-palsy, paralysis.
25	Mathias Raddle	68	Germany	March 2	Senility.
26	Daniel Riely	59	Ireland..	March 3	Cancer of stomach.
27	John Keifer	37	U. S. . . .	March 17	Brain disease and apoplexy.
28	Martin Murphy	82	Ireland..	March 20	Chronic bronchitis.
29	John Leonard	42	Ireland..	March 29	Consumption.
30	Leonard Graff	47	U. S. . . .	March 31	Consumption.
31	Aden Chapman	64	England.	April 4	General dropsy.
32	Casper Wetzel	59	Germany	April 4	General dropsy.
33	Robert Shaw	69	U. S. . . .	April 5	Chronic bronchitis.
34	Thomas Kensella . . .	70	Ireland .	April 12	Insanity ; died at Willard Asylum.

SCHEDULE "A." — (Continued.)

Number.	Name.	Age.	Nativity.	Date of death.	Disease.
35	William H. Hooper.	69	U. S....	April 16	Insanity ; died at Willard Asylum.
36	Edward S. McCarthy	50	Ireland .	April 18	Consumption.
37	Jacob Kiehl.....	55	Germany	April 21	Rheumatism and disease of lungs.
38	George Charles.....	52	U. S....	April 30	Tumor of bowels.
39	Orman B. Owens....	44	U. S....	May 6	Consumption.
40	William Van Rhine.	66	Germany	May 7	Heart disease.
41	Jacob Hoffman.....	64	Germany	May 8	Consumption.
42	Jacob I. Lewis.....	53	U. S ...	May 18	Consumption.
43	Ludwig Frederick...	62	Germany	May 20	Paralysis of heart.
44	Thomas O'Hare.....	61	Ireland..	May 23	Ossification of heart.
45	John Ivan.....	68	England.	May 23	Paralysis.
46	James W. Lewis....	45	U. S....	May 26	Consumption.
47	Michael Smith.....	43	U. S....	June 5	Ague and exhaustion.
48	Michael Nolan.....	68	Ireland .	June 6	General dropsy.
49	James Wright.....	86	U. S....	June 7	Chronic diarrhoea.
50	Richard Williams...	65	U. S....	June 8	Cancer of stomach and epilepsy.
51	Charles W. Wheeler.	64	U. S....	June 15	Fistula and exhaustion due to mult.
52	Jeff. McAvoy.....	50	Canada...	July 3	Consumption.
53	John Callahan.. ...	68	Ireland .	July 3	Dropsy (cardiac) and old age.
54	Frederick Ronge....	77	Germany	July 24	Chronic inflammation of bladder.
55	Ed. W. Hardenberg..	75	U. S....	Sept. 7	Septicæmia.
56	Robert Anderson....	68	U. S....	Sept. 16	Dysentery.
57	James Neil.....	65	Ireland .	Sept. 25	Insanity.
58	George Mathews....	83	Ireland .	Sept. 30	Exhaustion due to diarrhoea.

SCHEDULE "B."

The ages of patients having died at the New York State Soldiers and Sailors' Home Hospital during the year ending September 30, 1884, range as follows :

Between the ages of 30 and 40	2
Between the ages of 40 and 50	11
Between the ages of 50 and 60	10
Between the ages of 60 and 70	22
Between the ages of 70 and 80	8
Between the ages of 80 and 90	5
Total	<u>58</u>

Gen'l THOS. G. PITCHER, U. S. A., *Superintendent New York State Soldiers and Sailors' Home* :

SIR — I have the honor to submit the following report of the farm and garden during the year, with report of clothing received, issued and remaining on hand, October 1, 1884, also report of commissary stores received, issued and remaining on hand for the same period, showing the cost per capita.

Received from Farm and Garden.

3,496 bushels potatoes, at 30 cents.....	\$1,048 80
8,500 heads cabbage, at 7 cents.....	595 00
500 heads celery, 5 cents.....	25 00
17 tons stalks, at \$5.....	85 00
98 tons hay, at \$10	980 00
265 bushels wheat, at \$1	265 00
1,000 bushels oats, at 30 cents	300 00
20 tons straw, \$5.25	105 00
1,094 bushels corn, at 30 cents	328 20
282 bushels buckwheat, 50 cents.....	141 00
30 bushels vegetable oysters, at \$1	30 00
800 bushels turnips, at 40 cents.....	320 00
176 bushels parsnips, at 50 cents.....	88 00
615 bushels onions, at \$1	615 00
368 bushels carrots, at 40 cents.....	147 20
112 bushels beets, at 40 cents	44 80
50 bushels parsley, at \$1.....	50 00
17 bushels beans, at \$2	34 00
9,689 pounds fresh pork, at 7 cents.....	678 23
Received from garden from May 1 to October 1, 1884, vegetables, etc., amounting to.....	1,307 43
Pasturing 18 cows and 10 steers, 28 head, 5 months, at \$42 per month	210 00
11,296 gallons milk, at 12 cents	1,355 52
	<hr/>
	\$8,753 18

Expenses.

Labor	\$2,158 50
Fertilizers.....	335 00
Seeds and incidentals.....	250 84
	<hr/>
	2,744 34
	<hr/>
	\$6,008 84
	<hr/> <hr/>

Statement of clothing on hand, purchased and issued during the year, commencing October 1, 1883, and ending September 30, 1884, showing the cost per capita, etc.

	Overcoats.	Dress coats, \$2.50.	Hats, \$1.00.	Jackets, \$4.00.	Blouses, \$2.45.	Pants, \$2.60.	Overshirts, 41¢ cents.	Undershirts, 37½ cents.	Drawers, 37½ cts.	Shoes, prs., \$1.30.	Stockings, prs., dozen, \$1.40.	Vests, \$2.20.	Ruskins, 87½ cts.	Boots, rubber, \$3.25.	Slippers, 75 cents.	Suits, clothing, \$5.00.	Overalls and jumpers, 42 cts.	Scarfs, 14½ cents.	Dressing gowns, 60 cents.	Total.
On hand October 1, 1883.....	409	.....	604	85	.....	207	876	542	595	76	1,033	.....	.....	12	76	16	.....	.....	.....	\$2,679 30
Purchased during the year.....	.....	14	516	124	590	481	120	864	696	519	2,410	726	60	11	60	.....	99	552	108	7,309 18
Taken up for reissue.....	.....	.....	.....	60	57	38	92	.....	.....	67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	409	14	1,120	278	647	726	1,088	1,406	1,291	662	3,463	726	60	23	136	16	99	552	108	\$8,988 48
Total issued during the year.....	.....	.....	880	273	647	726	1,188	907	1,162	662	2,614	597	60	23	101	.....	15	552	106	8,942 35
On hand to date.....	409	14	240	.....	.....	.....	.....	499	129	.....	845	129	.....	.....	35	16	84	.....	2	\$1,046 13

Average number present during the year..... 574
Average cost per man for clothing \$15 58

Statement of clothing — (Continued).

Second hand clothing.	Jackets	Blouses.	Pants.	Shoes.	Overshirts.	Undershirts.	Drawers.	Vests.
On hand from first quarter...	110	..	50	24	..	13	..	...
Received, first quarter.....	15	17	23	4	25	14	15	...
Received, second quarter...	24	37	42	10	26	48	29	...
Received, third quarter.....	150	30	45	35	60	72	35	...
Received, fourth quarter.....	37	53	69	22	49	39	31	33
Total issued.....	336	137	229	95	160	186	110	33

Statement of commissary stores on hand, purchased and issued during the year, commencing October 1, 1883, and ending September 30, 1884, showing the cost per capita.

	On hand Septem-ber 30, 1883.	Purchased dur-ing the year.	Total on hand and purchased.	Issued during the year.	On hand Septem-ber 30, 1884.
Apples, dried, barrel..	.....	2,373	2,373	1,578	795
Apples, green, bushel.	.....	14	14	14	.....
Allspice, lbs.....	12	.....	12	11	1
Beef, fresh, lbs.....	1,949½	110,904	112,853½	112,605½	248½
Beef, corn, lbs.....	530	5,072½	5,602½	5,602½	.....
Butter, lbs.....	295¾	19,275	19,570¾	19,329	241¾
Beans, lbs.....	3,119	3,094	6,213	4,714	1,499
Beans, cans.....	.....	2	2	2	.....
Bacon, lbs.....	.....	1,099	1,099	1,097	2
Baking, powder, lbs..	.....	4	4	2	2
Baking soda, lbs.....	60	70	130	130	.....
Cloves, lbs.....	15	10	25	15½	9½
Cranberries, quarts...	.....	128	128	128	.....
Currants, lbs.....	148	391	539	491½	47½
Corn, starch, lbs...	32	80	112	73	39
Cheese, lbs.....	65½	4,470½	4,535½	4,214½	321
Chocolate, lbs.....	8	.....	8	8	.....
Codfish, lbs.....	.....	5,820	5,820	5,228	592
Chow chow, bottles...	2	.....	2	2	.....
Crackers, lbs.....	364½	2,051	2,415½	2,252	163½
Coffee, lbs.....	384½	14,420	14,804½	14,087	717½
Corn, cans.....	86	72	158	127	31
Cinnamon, lbs.....	8¾	24	32¾	24¾	8

Statement of commissarys stores — (Continued).

	On hand Septem- ber 30, 1883.	Purchased dur- ing the year.	Total on hand and purchased.	Issued during the year.	On hand Septem- ber 30, 1884.
Eggs, dozen.....	.....	2,841	2,841	2,841	.....
Flour, wheat, lbs....	20,990	131,947	152,987	152,947	.....
Flour, buckwheat, lbs.	.....	50	50	50	.....
Fish, fresh, lbs.....	4	9,133	9,137	9,137	.....
Ginger, lbs.....	32	126	158	68½	89½
Goose, lbs.....	.....	144	144	144	.....
Hams... ..	119½	2,814	2,933½	2,695½	237½
Hominy, lbs.....	479	2,728	3,207	2,307	900
Jelly, assorted, bottles.	3	240	243	215	28
Jelly, currant, bottles.	.....	10	10	10	.....
Lemons, dozen.....	.....	18	18	18	.....
Lemon, extract, bottles	15	13	28	28	.....
Lard, lbs.....	69	1,383	1,452	1,359	93
La Reine, lbs.....	20½	85¾	106	106	.....
Mutton, lbs.....	37	21,246	21,283	20,905	378
Mackerel, lbs.....	486	6,045	6,531	5,993	538
Meal, corn, lbs.....	527	2,200	2,727	2,137	590
Meal, oat, lbs.....	283	3,200	3,483	2,458	1,025
Molasses, gallons.....	28½	1,442	1,470½	1,361½	109
Mustard, lbs.....	100	411	511	504	7
Matches, boxes.....	.....	1,421	1,421	1,421	.....
Maccaroni, lbs.....	10	77	87	87	.....
Oysters, quarts.....	1	91	92	92	.....
Onions, bushels.....	.....	9½	9½	9½	.....
Oranges, dozens.....	.....	4	4	4	.....
Pork, fresh, lbs.....	.....	8,827	8,827	8,827	.....
Pork, salt, barrels....	1,953½	20,248½	22,201½	17,392½	4,809
Peaches, dried, lbs....	..	656	656	236	420
Peaches, cans.....	8	324	332	330	2
Potatoes, Irish, bushel	.....	152¾	152¾	152¾	.....
Potatoes, sweet, bush'l.	.....	10	10	10	.....
Pears, can.....	31	49	80	80	.....
Pepper, lbs.....	16½	393	409½	409½	.....
Prunes, lbs.....	246	1,168	1,414	1,195	219
Rice, lbs.....	39½	3,574½	3,614	3,283	331
Soda, washing.....	113	2,141	2,254	1,936	318
Soap, hard.....	1,632½	3,618	5,250½	4,773½	477
Soap, castile, lbs.....	.....	7½	7½	7½	.....
Shoulders, lbs.....	317	9,005	9,322	9,044	278
Sugar, brown, lbs....	3,893½	26,850	30,743½	21,503	9,240½
Sugar, white, lbs....	304	1,868	2,172	1,965	207
Sardines, boxes.....	58	115	173	130	43

Statement of commissary stores — (Continued).

	On hand Septem- ber 30, 1883.	Purchased dur- ing the year.	Total on hand and purchased.	Issued during the year.	On hand Septem- ber 30, 1884.
Sausages, lbs.....	.....	34½	34½	34½	.....
Soapaona, lbs.....	.....	1	1	1	.....
Salt, lbs.....	1,517	12,930	14,447	13,014½	1,432½
Tea, lbs.....	307	2,881½	3,188½	2,937½	251
Tapioca, lbs.....	16	20	36	28	8
Tobacco, smoking....	513	2,639½	3,152½	3,152½	.....
Tobacco, chewing....	527½	2,708	3,235½	3,235½	.....
Turkey, lbs.....	.....	719	719	719	.....
Tomatoes, cans.....	34	1,570	1,604	1,604	.....
Vermicleli, lbs.....	11	12	23	23	.....
Vinegar, gallons.....	487	297	784	778	6
Vanilla, extract, b'ttl's.	4	.....	4	4	.....
Veal, lbs.....	101	4,173	4,274	4,274	.....
Whiskey, gallons	63¾	81¾	145½	83	52½
Wine, gallons.....	¾	105½	106½	90	16½
Wheat, cracked, lbs..	88	400	488	388	100
Sage.....	.....	5	5	5	.....
Pearline.....	.....	701	701	88	613

Value of articles on hand, September 30, 1883.....	\$2,318 62
Value of articles purchased during the year.....	37,952 47
Total.....	\$40,271 09
Value of issues during the year.....	38,247 57
Value of articles on hand September 30, 1884.....	\$2,023 52

Average number present during the year, 578.*
Average cost of ration, 18½ cents.
I certify the foregoing to be a true and correct statement, according
to returns on file in this office.
C. C. LEAVENS,
Steward.

* This average includes four citizen employees.

LIBRARIAN'S REPORT.

NEW YORK STATE SOLDIERS AND SAILORS' HOME, }
BATH, STEUBEN COUNTY, N. Y., }
September 30, 1884.

Gen. T. G. PITCHER, *Superintendent.*

SIR — I have the honor to submit the following report of the New York State Soldiers and Sailors' Home Library, for the year ending September 30, 1884.

Very respectfully,
JOHN KAY,
Librarian.

READING ROOM.

Daily Papers.

New York Herald, New York Sun, New York Tribune, New York World, New York Times, Brooklyn Eagle, Albany Knickerbocker, Albany Argus, Buffalo Daily Courier, Buffalo Evening News, Philadelphia Record.

Sunday Papers.

Brooklyn Eagle, Philadelphia Eagle.

Weekly Papers.

Poughkeepsie Eagle, Peck's Sun, Texas Siftings, Boston Pilot, Nautical Gazette, Harper's Magazine, Leslie's Magazine, Illustrated, Steuben Advocate, Steuben Signal, Steuben Courier, Steuben Herald, Hornellsville Times, Morris Chronicle, Salem Press.

CATALOGUE.

	Volumes.
Starin library, { history.....	275
{ fiction	86
Miscellaneous.....	267
Literature.....	40
Political	11
Public documents.....	82
Congressional records.....	30
American archives (fifth series).....	3
Scientific.....	243
Scribner (magazine bound).....	40

	Volumes.
Atlantic (magazine bound).....	41
Knickerbocker, bound.....	20
Putnam, bound.....	7
Galaxy, bound.....	10
Century, bound.....	4
Poetry, bound.....	45
History.....	313
Biography.....	210
Fiction.....	400
Travels.....	157
Harper's Monthly, bound.....	172
Harper's Weekly, bound.....	32
Harper's Miscellaneous, bound.....	38
Hon. D. P. Richardson official records, War of Rebellion.....	12
Religious works.....	205
Bible.....	21
Illustrated London News, bound.....	20
Seaside library.....	232
April, 1884, "Reed" library.....	182
German library.....	358
Amount bound volumes.....	3,556
Miscellaneous magazines, pamphlets, etc.....	421
Total.....	3,997

DONATIONS MADE DURING THE YEAR, AS FOLLOWS:

April, 1884, Captain M. A. Reed of New York city, Post Commander of the G. A. R., 182 volumes (with book case).

Public Documents.

Hon. D. P. Richardson, M. C.; August, 1884, Hon. John T. Cain, M. C.; July, 1884, Hon. W. F. Rogers, M. C.; July, 1884, Hon. R. P. Hower, M. C.

German Books.

December, 1883, Theodore Feldstein of New York city, German works; August, 1884, W. W. Allen, Bath, New York, miscellaneous papers; March 31, 1884, D. C. Hanford, Brookton, Tompkins county, miscellaneous papers; June 4, 1884, A. Stambach, Post 9, G. A. R., Buffalo, N. Y., magazines; June 6, 1884, G. G. Hallenbeck, magazines; July 11, 1884, Nichols, Bath, Illustrated London News, for the years 1857 to 1874, 18 years; July 28, 1884, Henry O'Barton, Cambridge, N. Y., magazines; August 23, 1884, O. L. Whitcomb, Argyle, Washington county, N. Y., magazines; May 29, 1884, Unknown, miscellaneous.

Average issue of books during the year 7,500, irrespective of magazines, about 150 volumes weekly.

Weekly Papers.

Cayuga Chief, Ovid Independent, Havana Journal, Chenango Union, Grocers and Packers Journal, Owego Blade, Orange County Press, Fayetteville Record.

Transient Papers.

Albany Union, Albany Times, Auburn Journal, Iron Review, New Jerusalem Messenger, Washington Vedette, Rochester Express, Christian Advocate, Radical Review, Auburn Journal.

German Daily Papers.

Three copies, New York Staats Zeitung; one copy, New York Zeitung; one copy, Brooklyn Freie Presse.

German Weekly Papers.

Der Long Islander, New York Wochenblatt, Rochester Wochenblatt, Deutscher Evangelist, Puck, Um Die Welt, Der Freischuetz.

Lost.

May 5, 1884, No. 132, history, geography of New York State, lost by Godfrey Braumaster, company O.

BY-LAWS

FOR THE GOVERNMENT OF THE BOARD OF TRUSTEES OF THE NEW YORK STATE SOLDIERS AND SAILORS' HOME.

ARTICLE I.

The meetings of the Board shall be held in the village of Bath, Steuben county, N. Y., unless otherwise ordered.

ARTICLE II.

The officers of this Board shall consist of a President, Vice-President, Secretary and Treasurer, who shall hold their offices until others are elected in their stead.

ARTICLE III.

The election of officers shall take place on the second Thursday in January in each year, which shall be the Annual Meeting, and quarterly meeting shall be held on the second Thursday of April, July and October.

ARTICLE IV.

Notices of meetings shall be mailed to each Trustee at least five days before each meeting.

ARTICLE V.

Special meetings of the Board may be called by the Secretary when directed by the President, or on the written request of three members of the Board.

ARTICLE VI.

The President shall preside at all meetings of the Board, and shall decide all questions of order, subject to an appeal to the Board. In the absence of the President, the Vice-President shall perform his duties.

ARTICLE VII.

The Secretary shall keep an accurate minute of the proceedings of the Board and of the Executive Committee.

ARTICLE VIII.

The Treasurer shall receive the moneys appropriated for the objects of the Home as the same shall be paid him by the State Comptroller, or other sources, and shall disburse the same upon the written order

of at least two (2) of the Executive Committee, or upon an order of the Board signed by the President and countersigned by the Secretary, and not otherwise; and shall execute a bond for the faithful performance of his duties as shall be required by the Board. He shall present to the Board at each quarterly meeting, a written report showing the condition of each fund appropriated for the Home.

ARTICLE IX.

The following standing committees shall be elected by the Board:

1. An Executive Committee to consist of five members.
2. An Auditing Committee to consist of three members.
3. A Committee on Buildings and Grounds to consist of five members.

ARTICLE X.

The Executive Committee shall constitute a permanent Board for counsel, advice and direction, and shall be vested with the powers of the Board of Trustees in all cases when the Board of Trustees shall not have otherwise ordered or determined. They shall keep minutes of their proceedings, and shall at each meeting of the Board make a full report of their proceedings since the previous meeting of the Board, and in the absence of the President, the Executive Committee may appoint a Chairman pro tem.

ARTICLE XI.

The Auditing Committee shall examine all vouchers for expenditures authorized by the Board of Trustees or Executive Committee, and shall also, previous to the annual meeting, examine the books of the Secretary and Treasurer, and making a report to the Board.

ARTICLE XII.

It shall be the duty of the Committee on Grounds to recommend from time to time the improvements to be made upon the grounds to the Board, or in its absence to the Executive Committee, to examine into and have charge of such improvements, and to see that the grounds are kept in order, and that the regulations of the Board of the Executive Committee are carried into effect.

ARTICLE XIII.

All contracts entered into by this Board shall be signed by a majority of the Committee having authority to make the same.

ARTICLE XIV.

The order of business of meetings of the Board, except when otherwise ordered, shall be :

1. Reading of the minutes of the previous meeting.
2. Communications.
3. Reports of officers.
4. Reports of Standing Committees.
5. Reports of Select Committees.
6. Motions and Resolutions.
7. Miscellaneous business.

ARTICLE XV.

The yeas and nays shall be called and recorded upon all questions involving the appropriation of money, whether by the Board or Executive Committee, and upon all other questions upon the request of one trustee. All resolutions shall be in writing, with the name of the mover thereon. All reports shall be signed by a majority of the Committee to whom the same was referred.

The By-Laws may be amended at any meeting of the Board by a vote of three-fourths of the members of the Board.

RULES AND REGULATIONS.

OFFICERS.

The officers in charge of the Home shall consist of a Superintendent, Surgeon, and such subordinate officers as the Superintendent may appoint, subject to the approval of the Board of Trustees.

The Superintendent and Surgeon shall be appointed by the Board of Trustees, and shall hold their offices during the pleasure of the Board.

The salaries or compensation of all officers, inmates or employees of the Home shall be fixed by the Board of Trustees.

SUPERINTENDENT.

The Superintendent shall have charge of the accounts of the Home, and shall render to the Board of Trustees, at such times as the Board may fix, a full and detailed account of its receipts and expenditures. He shall make quarterly returns in duplicate of all personal property owned by, or that may be purchased by the Home. The said returns shall be made in the manner and be accompanied with the vouchers required from officers of the Quartermasters and substituted departments of the U. S. Army. One copy to be transmitted to the Comptroller of the State by the Secretary, and the other filed at the Headquarters of the Home.

He shall also report to the Comptroller of the State, on or before the 10th day of January, April, July and October, in each year, a detailed statement of all receipts and payments during the preceding quarter, and of the amount of money on hand. He shall reside on the premises belonging to the Home; and shall have sole charge of the inmates, and be responsible to the Board of Trustees for their good conduct; and may establish such rules and regulations for the discipline, and government of the inmates, not in conflict with the rules and regulations of the Board of Trustees, as he may deem proper.

The Superintendent may appoint from to time such subordinate officers as may be necessary, and fix their duties. He shall also recommend, to the Board of Trustees, such measures as he may deem for the benefit of the Home.

The Superintendent shall keep a record of Morning Reports in the form substantially of Regimental Morning reports required in the military service of the United States.

He shall also keep a Register of inmates containing substantially the following, viz.: Number, name, age, nativity, occupation, date of admission, residence at the time of admission, residence at the time of entering service, date of enlistment, company, regiment, date of discharge, causes of discharge, diseases or disability, domestic relation, pensioned or not, rate of pension, remarks; which Register shall be known as the "*General Register*."

He shall also keep a Register to be known as the "Death Register," in which he shall enter substantially as follows: Number, register number, name, nativity, age, company, regiment, cause of death, date, place of death, where buried, number of grave, and remarks.

SURGEON.

The Surgeon shall be a competent Physician and Surgeon, legally licensed to practice medicine and surgery under the laws of the State of New York, and of not less than five years' practice. He shall not be required to reside at the Home, but shall visit the same daily at a time to be designated by the Superintendent, and at all other times when notified. He shall make weekly examination of the buildings of the Home and their sanitary arrangements and condition, and make such suggestions to the Superintendent touching the health of the inmates — the sanitary condition of the Home, and the police system of the grounds, as he may deem advisable.

The Surgeon in charge shall furnish his own medical and surgical instruments, but all necessary medicines or medical stores shall be furnished at the expense of the Home.

Religious services shall be held on Sunday at the Home, as such time and place as the Superintendent may designate.

ADMISSION.

No person shall be admitted to the benefits of the Home until he shall have submitted a formal application in writing or print, signed by himself, and the same shall have been favorably acted upon by a member of the Board of Trustees. Such application shall be accompanied by an honorable discharge, or proof thereof, and evidence satisfactory to the Board of Trustees, as follows:

1. That he served in the army or navy of the United States during the late rebellion, and enlisted from the State of New York, or shall have been a resident for one year preceding his application for admission.

2. That he is disabled from a wound or wounds received while in the service of the United States, or from sickness, or disability, contracted therein, or needs the aid or benefit of the Home in consequence of physical disability.

3. That he has at the date of his application no property or means of support, and that he is unable to support himself by his own effort and labor.

4. That he has no relative of sufficient ability to maintain him, who are legally liable for his support under the Laws of the State of New York.

5. Applicant's name in full, his age, and occupation, place of nativity, and place of residence, at the time of application and of entering the service.

6. The Company and Regiment or Vessel in which, and the Captain, Colonel, or officer under whom he served.

7. The date of his enlistment and discharge.

8. If the applicant is a United States pensioner, he must file his pension certificate with his application, to be retained by the Home while he remains an inmate thereof.

9. If not a pensioner, the affidavit of the applicant that he is not.

10. If the applicant is a United States pensioner, he must file with his application a consent or agreement to transfer to the Superintendent immediately after receiving his quarterly pension, the whole amount received by him as such pensioner. The money so paid shall be deposited with the Treasurer of the Home, subject to the disposition of the Board of Trustees; and that he will execute any necessary power or voucher for receiving the same.

11. The applicant's agreement to conduct himself properly, and submit to the rules, regulations and discipline of the Home.

12. The applicant shall also furnish satisfactory proof of his identity.

13. The certificate of a Justice of the Supreme Court or County Judge or Clerk of the County where the applicant resides, or a member of the Board of Trustees, that he has carefully examined the proofs — that to the best of his knowledge and belief they are true and are satisfactory to him, and that the applicant is a proper person for admission.

14. No persons will be admitted to the Home, who at the time of making application are inmates of any of the National Homes, or who have been discharged therefrom within three months previous.

CONDUCT OF INMATES.

1. All inmates of the Home will conduct themselves at all times in a quiet and orderly manner, and observe strict courtesy toward the officers and in their intercourse with each other. They will discharge such duties as may be required of them by the Superintendent. Any inmate who is habitually intoxicated, disobeys orders, or who refuses to perform, without pay, any labor or duty imposed upon him will be summarily discharged by the Superintendent.

2. Profanity and vulgarity are forbidden, and quarrels among the inmates or employees will submit the offenders to punishment.

3. The use of intoxicating liquors on the grounds or in the buildings is prohibited, and any inmate bringing it upon the grounds or into the buildings will be punished.

4. No smoking will be allowed in the buildings except in the rooms designated by the Superintendent for that purpose.

5. Scrupulous cleanliness in person and dress is enjoined.

6. Water, sweepings or refuse of any sort shall not be thrown from the windows or doors of the buildings, but must be put in places designated by the Superintendent.

7. Marking on the walls is forbidden, and defacing the buildings, trees, fences, or structures will subject the offender to punishment, and render him liable to the Home for the damage done.

8. Inmates shall not leave the grounds of the Home, enter the barns, stables, shops, kitchen, laundry, or detached buildings, without permission of the Superintendent.

9. Inmates shall appear at all times in the uniform or dress established by the Board of Trustees.

10. At Reveille the inmates shall rise, wash themselves neatly; and when assembled for breakfast, before entering the dining room, the officer in charge of each detachment shall inspect his men and report any neglect to the Superintendent.

11. A call will be sounded fifteen minutes before each meal to allow preparation therefor.

12. The Superintendent shall designate the hours for reading and smoking, and during those hours will allow all men not on duty access to the reading and smoking rooms.

13. At Tattoo all inmates shall retire to their quarters, and at Taps all lights will be extinguished.

14. No inmate or employee, other than the persons assigned to such duty, shall at any time interfere or meddle with the furnaces, ranges, lights, sewers or water-works of the Home.

15. From the first of April to September 30, Reveille will be sounded at 5:30 A. M., and Retreat at 6 P. M. From the first of October to March 31, Reveille will be sounded at 7 A. M., and Retreat at 4:30 P. M.

16. Tattoo will be sounded at 9 P. M., and Taps half an hour later.

17. The Superintendent will designate the hours for meals.

18. The officers in charge of detachments will call the roll of their respective detachments respectively at Reveille and Tattoo, and absentees will be reported to the Superintendent.

19. All inmates must be prompt at stated roll calls, unless on duty or excused on account of sickness.

20. Complaints of neglect or ill treatment must be made in writing to the Board of Trustees, through the Superintendent.

EXPULSIONS.

Any inmate of the Home may be expelled by the Board of Trustees, the Executive Committee, or Superintendent, for a willful violation of the rules and regulations.

RE-ADMISSION.

Whenever any inmate has been expelled from the Home he may be re-admitted upon application to the Board of Trustees or Executive Committee, upon satisfying the Board or Committee, that he will in future conduct himself properly, and observe and obey the rules and regulations of the Home, and perform such duty without compensation as the Superintendent shall deem proper.

DISCHARGES.

1. Any inmate of the Home may receive an honorable discharge at any time upon his application therefor.

2. Whenever the Board of Trustees are satisfied that any inmate has sufficient ability or means to support himself they may discharge him.

3. All discharges shall state the reason therefor.

FURLOUGHES.

Furloughs may be granted to inmates of the Home by the Superintendent whenever he may deem it necessary or proper.

The above amendments to the rules governing the Home are hereby approved.

Albany, N. Y., May 15, 1880.

J. W. WADSWORTH,

Comptroller.

N. B.—The friends of applicants are hereby notified, that men of unsound mind ought not to be sent here, as the Home cannot give them the care and attention such cases require.

T. G. PITCHER,

Superintendent.

LIST OF INMATES ADMITTED — Continued.

NAME.	Co.	Regiment.	Age.	Service.	Nativity.	Occupation.	Disability.	Admitted.	Pen- alties.	Remarks.
David Scofield	D	104 New York Inf.	66	1-12	U. S.	Laborer.	Injury to ankle.	Jan. 22, 1879		Sum. disch'ged, May 10, 1883
James Barrett	C	71 New York Inf.	54	2-12	Ireland.	Moulder.	Pleurisy.	Jan. 23, 1879		
	D	104 New York Inf.	50	3	Ireland.	Carpenter.	Varicose veins.	Jan. 25, 1879		Hon. disch'ged, April 30, 1880
	E	75 New York Inf.	45	2-10-12	Ireland.	Stone mason.	Rheumatism.	Jan. 27, 1879		Hon. disch'ged, Mar. 18, 1880
	I		60	3	England.	Painter.	Hernia.	Jan. 28, 1879		Hon. disch'ged, Sept. 16, 1879
	O		46	1-12	Ireland.	Gardener.	Shell wound.	Jan. 29, 1879		Hon. disch'ged, June 27, 1879
			62	4	U. S.	Blacksmith.	Chr Rheumatism.	Feb. 1, 1879		Hon. disch'ged, May 16, 1879
	B		55	2-10-12	Germany.	Brewer.	Rheumatism.	Feb. 1, 1879		Died, March 2, 1884
	B		61	2	Germany.	Laborer.	Rheumatism.	Feb. 4, 1879		Hon. disch'ged, May 13, 1879
	K		50	2-10-12	England.	Painter.	Varicose veins.	Feb. 4, 1879		Inmate asylum, April 17, 1883
	L		36	6-12	England.	Bookbinder.	Epilepsy.	Feb. 4, 1879		Died, July 18, 1883
	L		45	10-12	U. S.	Soldier.	Rheumatism.	Feb. 4, 1879		Sum. disch'ged, June 29, 1880
	H		53	3	U. S.	Laborer.	Pleurisy.	Feb. 4, 1879		Sum. disch'ged, July 26, 1883
	H		52	2	Switzerland.	Laborer.	Loss of leg.	Feb. 5, 1879		
	I		76	10-12	Ireland.	Laborer.	Diarrhea.	Feb. 5, 1879		
	I		66	4	U. S.	Saddler.	Injury to spine.	Feb. 5, 1879		Hon. disch'ged, Mar. 22, 1883
	F		62	4-12	Ireland.	Physician.	Disease of mouth.	Feb. 5, 1879		Deserted, Sept. 16, 1880
	A		49	1-12	U. S.	Laborer.	Rheumatism.	Feb. 5, 1879		Sum. disch'ged, Mar. 11, 1880
	C		46	3	Ireland.	Laborer.	Loss of leg.	Feb. 5, 1879		Died, April 24, 1882
	G		45	3	England.	Machinist.	Rheumatism.	Feb. 5, 1879		
			43	2	England.	Distiller.	Pneumonia.	Feb. 6, 1879		
	A		68	1-12	U. S.	Farmer.	Asthma.	Feb. 6, 1879		
	H		53	1	Switzerland.	Laborer.	U. S. wound.	Feb. 6, 1879		
	I		44	3	Switzerland.	Farmer.	Shell wound.	Feb. 6, 1879		
	D		62	2	U. S.	Laborer.	Injury to side.	Feb. 6, 1879		
	A		61	2-11-12	U. S.	Tailor.	Rheumatism.	Feb. 7, 1879		
	D		63	2	Ireland.	Shoemaker.	Injury to knee.	Feb. 8, 1879		
	C		79	1	Ireland.	Farmer.	Rheumatism.	Feb. 9, 1879		Hon. disch'ged, May 14, 1879
			67	3	Ireland.	Baker.	Eye disease.	Feb. 10, 1879		Died, July 16, 1883
	H		64	3-12	Ireland.	Farmer.	Hernia.	Feb. 11, 1879		
	H		49	3	England.	Burgess.	Injury to hand.	Feb. 11, 1879		
	E		63	1	England.	Drayman.	General debility.	Feb. 11, 1879		
			68	1	Ireland.	Laborer.	Bursaroke.	Feb. 11, 1879		
	D		69	1	Ireland.	Laborer.	General debility.	Feb. 11, 1879		
	A		63	1	Ireland.	Laborer.	Rheumatism.	Feb. 11, 1879		
	B		49	1	Ireland.	Boiler maker.	Rheumatism.	Feb. 11, 1879		
	A		37	1	Ireland.	Plasterer.	General debility.	Feb. 11, 1879		
	A		46	1	Ireland.	Laborer.	Blindness.	Feb. 11, 1879		
	D		56	4	Ireland.	Shoemaker.	Paralysis.	Feb. 11, 1879		
	A		59	2	Germany.	Tailor.	U. S. wound.	Feb. 11, 1879		
	H		60	2-10-12	Ireland.	Laborer.	General debility.	Feb. 11, 1879		
	K		60	3	Ireland.	Carpenter.	Bursaroke.	Feb. 11, 1879		
	B		71	3	Ireland.	Postman.	General debility.	Feb. 11, 1879		
	D		71	7-12	U. S.	Miller.	Rheumatism.	Feb. 11, 1879		
	K		71	1	England.	Laborer.	General debility.	Feb. 11, 1879		
	B		64	1	Ireland.	Laborer.	Blindness.	Feb. 11, 1879		
	D		49	3	Ireland.	Laborer.	Paralysis.	Feb. 11, 1879		
	F		64	1	U. S.	Laborer.	U. S. wound.	Feb. 11, 1879		
	G		61	11-12	Ireland.	Laborer.	U. S. wound.	Feb. 12, 1879		

John A. Hughes

Spencer Turner

Wm. H. Moore

Patrick Joyce

John Ryan, second

La Fayette Gleason

James Callaghan

Donle McCarthy	67	4	9-12	Ireland	Laborer	G. S. wound	Feb. 12, 1879	Sum. disch'ged, May 23, 1879
Patrick Campbell	68	3	9-12	Ireland	Laborer	Hernia	Feb. 13, 1879	Died, April 10, 1883
Edward Corbett	69	1	11-12	U. S.	Butcher	Rheumatism	Feb. 14, 1879	Hon. disch'ged, April 4, 1882
James O'Hara	70	2	11-12	Ireland	Farmer	Asthma	Feb. 17, 1879	Hon. disch'ged, April 10, 1882
Charles F. Lockwood	71	2	4-12	U. S.	Farmer	General debility	Feb. 17, 1879	Hon. disch'ged, July 26, 1880
Casper Rhinehardt	72	4	4-12	Germany	Farmer	General debility	Feb. 17, 1879	
James Healey	73	5	4-12	Ireland	Cook	Injury to hand	Feb. 17, 1879	
John H. Nolan	74	2	11-12	U. S.	Moulder	Paralysis	Feb. 18, 1879	Hon. disch'ged, May 1, 1882
Thomas Foley	75	1	11-12	Ireland	Marble cutter	Hernia	Feb. 18, 1879	Died, January 1, 1883
Frederick Ramsey	76	3	11-12	U. S.	Butcher	Injury to spine	Feb. 19, 1879	Deserted, June 14, 1881
Charles Riley	77	2	4-12	Ireland	Laborer	Rheumatism	Feb. 20, 1879	Died, April 20, 1879
Michael Delaney	78	3	4-12	Germany	Shoemaker	Inanition	Feb. 21, 1879	Hon. disch'ged, June 10, 1881
Wm. H. Shoell	79	2	4-12	Scotland	Shoemaker	G. S. wound	Feb. 21, 1879	Hon. disch'ged, May 13, 1879
James Root	80	3	10-12	Ireland	Manufacturer	Injury to spine	Feb. 21, 1879	Inmate asylum, Aug. 24, 1879
Charles Donnelly	81	2	10-12	Ireland	Valet	Hernia	Feb. 22, 1879	Deserted, December 8, 1881
Peter Murphy	82	3	10-12	U. S.	Laborer	General debility	Feb. 23, 1879	Hon. disch'ged, Jan. 2, 1880
Calvin L. Jenks	83	4	10-12	Ireland	Farmer		Feb. 23, 1879	Deserted, May 18, 1881
Henry Ryan	84	3	2-12	Germany	Morocco finisher		Feb. 23, 1879	Hon. disch'ged, Mar. 27, 1884
Bartholomew Muench	85	3	2-12	Ireland	Farmer		Feb. 23, 1879	
James Hostin	86	3	2-12	Ireland	Fireman		Feb. 23, 1879	
Thomas Rydet	87	3	2-12	Ireland	Laborer		Feb. 23, 1879	
Hugh Crossin	88	3	2-12	Ireland	Boatman		Feb. 23, 1879	
Osra A. Simmons	89	3	2-12	U. S.	Farmer		Feb. 24, 1879	Hon. disch'ged, Sept. 25, 1879
John D. Coottingham	90	3	2-12	U. S.	Printer		Feb. 24, 1879	Deserted, June 19, 1881
John Welsh	91	3	2-12	U. S.	Fireman		Feb. 25, 1879	Sum. disch'ged, June 23, 1880
Patrick Miley	92	4	2-12	U. S.	Carpenter		Feb. 26, 1879	Deserted May 29, 1882
John King	93	4	2-12	Ireland	Laborer		Feb. 26, 1879	Hon. disch'ged June 23, 1880
Henry Norton	94	4	2-12	U. S.	Farmer		Feb. 26, 1879	Died, March 6, 1882
Christopher Wehmar	95	1	4-12	Germany	Driver		Feb. 28, 1879	Hon. disch'ged, June 9, 1879
Lewis Beck	96	3	1-12	Germany	Shoemaker		Mar. 1, 1879	Deserted, May 12, 1879
Charles Schmidt	97	3	1-12	Germany	Laborer		Mar. 1, 1879	Hon. disch'ged Oct. 13, 1880
Edward Brick	98	3	1-12	Ireland	Laborer		Mar. 1, 1879	Died, Nov. 24, 1880
Thomas Riley	99	3	1-12	U. S.	Baker		Mar. 3, 1879	Hon. disch'ged, Feb. 1, 1881
Walter F. Burd	100	3	4-12	U. S.	Carpenter		Mar. 6, 1879	Hon. disch'ged, June 23, 1879
Harvey Blackmore	101	3	4-12	U. S.	Engineer		Mar. 6, 1879	Died, July 24, 1884
Michael Welsh	102	3	4-12	Ireland	Laborer		Mar. 6, 1879	
Frederick Ronge	103	3	4-12	Germany	Carpenter		Mar. 7, 1879	
Lionel N. Peterson	104	3	4-12	U. S.	Clerk		Mar. 7, 1879	
Frederick Rothfuss	105	3	4-12	Germany	Clerk		Mar. 7, 1879	
John Fleming	106	3	4-12	Germany	Barber		Mar. 7, 1879	
Edward Schmidt	107	3	4-12	Germany	Barber		Mar. 7, 1879	
Abraham Van Assum	108	3	4-12	Germany	Carpenter		Mar. 11, 1879	Hon. disch'ged, June 16, 1879
Benjamin F. Hanson	109	3	4-12	Holland	Laborer		Mar. 11, 1879	Deserted, June 6, 1879
Wm. T. Finley	110	3	4-12	U. S.	Laborer		Mar. 12, 1879	Hon. disch'ged, April 29, 1879
Michael Ahearne	111	3	4-12	U. S.	Engineer		Mar. 12, 1879	Died, May 11, 1883
John Hunniger	112	3	4-12	U. S.	Boatman		Mar. 12, 1879	Died, June 23, 1879
John Tewey	113	3	4-12	Germany	Laborer		Mar. 12, 1879	Deserted, January 3, 1883
Rudolph Knopp	114	3	4-12	Germany	Laborer		Mar. 12, 1879	Deserted, August 18, 1879
George H. Wheeler	115	3	4-12	Prussia	Watchmaker		Mar. 12, 1879	Sum. disch'ged, Dec. 22, 1881
Wm. O'Donnell	116	3	4-12	U. S.	Merchant		Mar. 12, 1879	Deserted, February 12, 1880
Edward Wilson	117	3	4-12	Ireland	Bricklayer		Mar. 13, 1879	
Alexander A. Crumple	118	3	4-12	England	Seaman		Mar. 13, 1879	Died, June 27, 1879
Richard Williamson	119	3	4-12	Scotland	Machineist		Mar. 13, 1879	Hon. disch'ged, Nov. 13, 1880
John Moran	120	3	4-12	Wales	Farmer		Mar. 13, 1879	
Patrick Murphy	121	3	4-12	Ireland	Tailor		Mar. 13, 1879	Sum. disch'ged, May 10, 1880
James Herrick	122	3	4-12	Ireland	Laborer		Mar. 14, 1879	Hon. disch'ged, Nov. 19, 1880

LIST OF INMATES ADMITTED—Continued.

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Sylvester Coughlin	C. P.	63 New York Inf.	1	7-12	Ireland	Laborer	Rheumatism	Mar. 21, 1879	Sum. disch'd, May 10, 1880
Patrick McGowan	C. P.	United States Navy	66	3-12	U. S.	Laborer	Rheumatism	Mar. 21, 1879	Died May 31, 1883
James Grover	C. P.	Gunner U. S. Navy	64	3-12	U. S.	Seaman	Gunshot wound	Mar. 21, 1879	Hon. disch'd, July 10, 1883
George Larkins	C. P.	United States Navy	36	3-12	U. S.	Stone cutter	Paraplegia	Mar. 21, 1879	
Thomas Butler	Lds.	United States Navy	49	3-12	Ireland	Laborer	Lung disease	Mar. 21, 1879	
Patrick Crowley	F. B.	4 New York Cavalry	64	3-12	Ireland	Cook	Gunshot wound	Mar. 21, 1879	Sum. disch'd, April 6, 1883
Edward Graham	B. B.	5 New York Cavalry	49	3-12	Ireland	Painter	Hemipia	Mar. 21, 1879	Died May 3, 1879
Wm. Doolan	B. A.	159 New York Inf.	62	3-12	Ireland	Blacksmith	General debility	Mar. 21, 1879	Sum. disch'd, Oct. 29, 1880
John Hanley	B. A.	115 New York Inf.	39	3-12	Ireland	Laborer	Hernia	Mar. 21, 1879	Hon. disch'd, Nov. 21, 1879
John A. Roth	Lds.	United States Navy	34	3-12	Germany	Shoemaker	General debility	Mar. 21, 1879	
Michael I. Dillon	H.	19 New York Inf.	44	11-12	Ireland	Agent	Gunshot wound	Mar. 21, 1879	Deserted September 8, 1879
John Baker	H.	67 New York Inf.	36	3-12	Ireland	Painter	Gunshot wound	Mar. 21, 1879	Sum. disch'd, June 15, 1880
John Farley	B. D.	87 New York Inf.	64	3-12	Ireland	Laborer	Gunshot wound	Mar. 21, 1879	Sum. disch'd, June 13, 1881
Mattew Murphy	H.	69 New York Inf.	38	3-12	Ireland	Boatman	Gunshot wound	Mar. 21, 1879	Sum. disch'd, May 6, 1879
Francis Denmarsh	H.	17 United States Inf.	34	3-12	Canada	Boatman	Gunshot wound	Mar. 21, 1879	Hon. disch'd, May 26, 1879
Thomas Nolan	G.	United States Navy	44	3-12	U. S.	Laborer	Gunshot wound	Mar. 21, 1879	Sum. disch'd, March 11, 1880
Francis Quilvere	E.	66 New York Inf.	63	2-12	France	Cabinet maker		Mar. 21, 1879	
Daniel Wilson	C.	175 New York Inf.	56	10-12	Ireland	Seaman		Mar. 21, 1879	Hon. disch'd, April 17, 1879
Michael Henick	D.	116 New York Inf.	54	10-12	Germany	Farmer		Mar. 21, 1879	Died August 2, 1881
John McOmick	G.	156 New York Inf.	50	10-12	Ireland	Laborer		Mar. 21, 1879	
Patrick Murphy	K.	47 New York Inf.	42	1-12	Ireland	Stone mason		Mar. 21, 1879	Died March 31, 1879
Augustus Mason	O.	13 New York H. A.	32	1-12	U. S.	Laborer		Mar. 21, 1879	Died November 3, 1882
Stephen McVane	O.	179 New York Inf.	36	6-12	U. S.	Laborer		Mar. 21, 1879	Sum. disch'd, Dec. 27, 1879
Charles Dixon	O. S.	United States Navy	47	1-12	U. S.	Tinsmith		Mar. 21, 1879	Deserted June 17, 1879
Home Churchhill	F.	47 New York Cavalry	50	6-12	U. S.	Carpenter		Mar. 21, 1879	Sum. disch'd, June 3, 1880
Louis Schroeder	F.	United States Navy	55	6-12	Germany	Baker		Mar. 21, 1879	Deserted March 23, 1883
Peter Martin	O. S.	37 New York Inf.	29	2-12	Canada	Seaman		Mar. 21, 1879	
John Zek	A.	2 New York H. A.	67	2-12	Germany	Farmer		Mar. 21, 1879	
Thomas Wallace	L.	33 New York Inf.	41	3-12	U. S.	Shingle dresser		Mar. 21, 1879	
Thomas Clark	A.	69 New York Inf.	60	3-12	England	Cabinet maker		Mar. 21, 1879	
Joseph McHenry	C.	2 New York H. A.	47	3-12	U. S.	Laborer		Mar. 21, 1879	
George Willis	A.	131 New York Inf.	33	3-12	Ireland	Boatman		Mar. 21, 1879	
Patrick Nellus	A.	71 New York Inf.	46	3-12	Ireland	Laborer		Mar. 21, 1879	Hon. disch'd, Nov. 2, 1880
Edward Wall	D.	88 New York Inf.	35	3-12	Ireland	Tailor		Mar. 21, 1879	Sum. disch'd, Dec. 27, 1879
William Hensel	E.	71 New York Inf.	31	3-12	Germany	Saddler		Mar. 21, 1879	Sum. disch'd, March 18, 1880
Peter Dunn	H.	174 New York Inf.	68	2-12	Ireland	Whip maker		Mar. 21, 1879	Sum. disch'd, March 18, 1880
James Sticks	C.	4 New York Cavalry	51	3-12	U. S.	Brewer		Mar. 21, 1879	Hon. disch'd, Nov. 13, 1880
Edward Wendel	C.	60 New York Inf.	55	3-12	Prussia	Blacksmith		Mar. 21, 1879	Died January 30, 1884
William Hill	B.	116 New York Inf.	56	3-12	France	Machinist		Mar. 21, 1879	
John Fels	C.	40 New York Inf.	50	3-12	Ireland	Farmer		Mar. 21, 1879	
John Fels	C.	102 New York Inf.	41	3-12	Ireland	Druggist		Mar. 21, 1879	Hon. disch'd, June 12, 1879
Charles Klock	C.	106 New York Inf.	65	3-12	U. S.	Laborer		Mar. 21, 1879	Deserted January 14, 1881
Joseph Wilson	C.	54 New York Inf.	57	3-12	Germany	Carpet weaver		Mar. 21, 1879	
John Burke	B.	33 New York Inf.	64	3-12	U. S.	Carpenter		Mar. 21, 1879	
Thomas Smith	B.	176 New York Inf.	54	3-12	England	Laborer		Mar. 21, 1879	
Bernard Augustin	H.	21 New York Inf.	57	3-12	Ireland	Printer		Mar. 21, 1879	
David L. Sholes	C.	9 New York Inf.	45	3-12	U. S.	Clerk		Mar. 21, 1879	
John Holl	A.	85 New York Inf.	45	3-12	Ireland	Shoemaker		Mar. 21, 1879	
William Tynan	D.	5 Ohio Inf.	42	3-12	Ireland	Laborer		Mar. 21, 1879	
John O. Curdin	C.	111 New York Inf.	36	3-12	Canada	Farmer		Mar. 21, 1879	
H. H. McIlhinney	A.	100 New York Inf.	54	3-12	Ireland	Boot fitter		Mar. 21, 1879	
Patrick Birmingham	D.	United States Navy	35	3-12	Ireland	Laborer		Mar. 21, 1879	Deserted October 8, 1879
Patrick Brennan	G.	United States Navy	34	3-12	Ireland	Seaman		Mar. 21, 1879	Sum. disch'd, March 14, 1884
Joseph Putnam	F.	72 New York Inf.	50	3-12	Ireland	Cigar maker		Mar. 21, 1879	Sum. disch'd, Sept. 13, 1879
John McCarthy	Lds.								
James Kalloran	Lds.								
Michael Fitzpatrick	F.								

LIST OF INMATES ADMITTED -- Continued.

NAMES.	Co.	Regiment.		Nativity.	Occupation.	Disability.	Admitted.	Pen- sion.	Remarks.
Charles H. Denio	K	136 New York Inf.	47	U. S.	Farmer	Loss of use of legs and feet	May 19, 1879		Deserted October 8, 1879
Raley Evans	F	27 New York Inf.	43	U. S.	Farmer	Chr Rheumatism	May 19, 1879		Hon. disch'gd, Oct. 8, 1879
John Kane, 3d	I		40	Ireland	Laborer	Ind.	May 17, 1879		Died March 11, 1882
John Kern	B		62	Ireland	Laborer	Ind.	May 16, 1879		Died November 17, 1880
William Butman	H		43	U. S.	Farmer	Ind.	May 12, 1879		Died September 25, 1881
John Madden	O		56	Ireland	Laborer	d age	May 22, 1879		Died December 20, 1882
Wm R. Rich	A		62	U. S.	Blacksmith		May 20, 1879		Died December 11, 1880
	C		47	Canada	Farmer		May 19, 1879		
	D		54	U. S.	Clerk		May 16, 1879		
	C		46	U. S.	Laborer	Gunshot wound	May 16, 1879		Hon. disch'gd, Oct. 25, 1879
	B		61	U. S.	Seaman	Gunshot wound	May 10, 1879		Sum. disch'gd, July 21, 1879
	G		61	Prussia	Salesman	Hemorrhoids	May 20, 1879		Died September 30, 1881
Harrison H. Mason	H		38	U. S.	R R conductor	Gunshot wound	May 16, 1879		Hon. disch'gd, Aug. 12, 1879
Emmanuel Albert	H		45	U. S.	Baker	Chr. Rheumatism	May 20, 1879		
James Boden	H		40	Ireland	Laborer	Heart disease	May 22, 1879		Died December 4, 1880
	A		81	U. S.	Laborer	Gunshot wound	May 13, 1879		Died July 4, 1879
	H		60	U. S.	Farmer	Rheumatism	May 22, 1879		Hon. disch'gd, July 15, 1879
	D		59	U. S.	Printer	Debility	May 14, 1879		Died June 6, 1882
	M		60	Germany	Engineer	Asthma	May 22, 1879		
	K		35	U. S.	Confectioner	Loss of leg	May 20, 1879		Hon. disch'gd, June 13, 1883
George W. Moops	B	8 New York H. A.	54	Ireland	Shoemaker	Chr Rheumatism	June 9, 1879		Hon. disch'gd, April 1, 1880
Patrick Paden	A	6 New York Cavalry	45	Scotland	Teamster	Gunshot wound	June 14, 1879	24 00	Sum. disch'gd, March 12, 1880
Hiram Shell	A	Fireman, U. S. Navy	44	Ireland	Seaman	Loss of leg	June 11, 1879	18 00	Sum. disch'gd, Dec. 27, 1879
Thomas Sullivan, Lieut	E	36 New York Inf.	46	U. S.	Blacksmith	Loss of arm	June 10, 1879		Sum. disch'gd, May 1, 1883
James Stirling	B	2 New York Cavalry	55	Ireland	Shirt cutter	Diarrhea	May 23, 1879		Hon. disch'gd, May 24, 1883
Frederick Hermsen	F	2 New York Cavalry	58	U. S.	Carpenter	Injury to back	June 9, 1879		Deserted February 6, 1882
Frederick Herker	I	2 New York Inf.	59	Dennmark	Musician	Hernia	June 11, 1879	14 00	Deserted April 29, 1880
Thos H. Handbach	B		63	Germany	Planer	Chr Rheumatism	June 17, 1879		Died September 14, 1881
	K		34	Ireland	Porter	Kidney disease	June 24, 1879	8 00	Died February 12, 1880
	C		70	U. S.	Carpenter	Malarial Fever	June 14, 1879		Sum. disch'gd, Sept. 13, 1881
	I		42	Ireland	Laborer	Rheumatism	June 17, 1879		Sum. disch'gd, July 17, 1880
	I		61	U. S.	Machineist	Rheumatism	June 30, 1879		Died June 1, 1880
	A		46	Canada	Laborer	Chr. Rheumatism	June 9, 1879		Deserted February 21, 1881
	B		47	Ireland	Laborer	Hernia	May 12, 1879		Deserted March 19, 1880
	D		70	U. S.	Farmer	Tumor	June 14, 1879		
	D		57	Ireland	Laborer	Rheumatism	June 17, 1879		
	G		45	Germany	Farmer	Gunshot wound	June 20, 1879	3 00	Deserted October 30, 1879
	H		53	Ireland	Cabinet maker	Hernia	June 14, 1879		Hon. disch'gd, March 11, 1880
	I		59	Ireland	Tanner	Lung disease	June 11, 1879		
	O		64	U. S.	Carpenter	Chr. diarrhoea	June 25, 1879		Hon. disch'gd, Sept. 2, 1880
	C		54	U. S.	Seaman	Injury to back	June 17, 1879		Hon. disch'gd, Nov. 8, 1883
	P		54	Ireland	Laborer	Rheumatism	June 14, 1879		Deserted December 17, 1880
	D		37	U. S.	Iron worker	Chr. diarrhoea	June 11, 1879		Hon. disch'gd, March 15, 1880
	B		42	U. S.	Drug clerk	Hernia	June 11, 1879		Sum. disch'gd, July 16, 1883
	A		44	U. S.	Machineist	Chr. dysentery	June 16, 1879		Hon. disch'gd, June 28, 1884
	O		40	Ireland	Bookkeeper	Loss of arm	June 14, 1879	24 00	Hon. disch'gd, March 2, 1880
	A		56	Germany	Laborer	Chr. Rheumatism	June 30, 1879		
	O		60	Germany	Marble cutter	Gunshot wound	June 21, 1879		Sum. disch'gd, June 24, 1879

John Smith	36 New York Inf.	1	5-12	Scotland	Pipe maker	June 23, 1879	5 00	Hon. disch'gd, Nov. 15, 1883
William Brannigan	70 New York Inf.	2	5-12	Ireland	Laborer	June 18, 1879	24 00	Hon. disch'gd, Dec. 10, 1879
William Mitchell	1 Veteran Cavalry	30	6-12	Ireland	Cabinet maker	June 9, 1879		
Harry Clark	6 New York H. A.	35	7-12	U. S.	Soap maker	June 18, 1879		Sum. disch'gd, April 21, 1884
Lealle Smythe	2 New York Inf.	36	9-12	Ireland	Draughtsman	June 13, 1879		Deserted July 11, 1883
David Yates	8 New York S. M.	51	3-12	England	Bar tender	June 23, 1879	5 34	
Harlin Abbott	77 New York S. M.	36	2	U. S.	Cigar maker	June 9, 1879		Hon. disch'gd, March 10, 1880
John Burke	4 New York H. A.	34	10-12	Ireland	Laborer	June 17, 1879		Sum. disch'gd, March 14, 1882
Henry Frederick	1 New York Cavalry	60	10-12	Germany	Laborer	June 18, 1879		Deserted August 12, 1880
John Freehill	40 New York Inf.	54	1-12	Ireland	Laborer	June 21, 1879	8 00	Sum. disch'gd, Nov. 6, 1879
Louis Bertrand	76 New York Inf.	63	2	Canada	Rheumatism	June 24, 1879	8 00	Deserted August 16, 1880
Adalbert G. Godley	21 New York Cavalry	32	6-12	U. S.	Phoenician	June 21, 1879	18 00	Hon. disch'gd, Sept. 11, 1879
John Murphy		47	3	Ireland	Painter	June 17, 1879		Insane Asylum, April 11, 1882
William Lange		65	4	Ireland	Tanner	June 13, 1879	6 00	
Ernest Putsch		59	7-12	Ireland	Fanner	June 17, 1879		Hon. disch'gd, Aug. 31, 1880
William S. Hawley		51	3	U. S.	Brass fitter	June 12, 1878		Deserted October 23, 1879
John L. Tutbill		44	5-12	Germany	Iron worker	June 25, 1879	18 00	Hon. disch'gd, Dec. 15, 1879
James Dodan		54	2-12	U. S.	Plasterer	June 7, 1879		Hon. disch'gd, April 16, 1883
George H. O'Brien		32	8	Ireland	Laborer	June 10, 1879		
William Boyd		60	3	U. S.	Sailor	June 24, 1879	13 25	Sum. disch'gd, March 11, 1880
Charles O'Bryan		55	4	U. S.	Painter	May 19, 1879		Hon. disch'gd, April 4, 1882
Joseph Straub		46	11-12	Ireland	Laborer	June 19, 1879		
William Rows		48	11-12	Ireland	Laborer	June 28, 1879		
John C. Wenyan		42	1-12	Ireland	Laborer	June 25, 1879		
William Rows		49	6-12	Germany	Clerk	June 26, 1879		
Joe. M. Moore		73	2	U. S.	Farmer	July 1, 1879		Hon. disch'gd, Dec. 27, 1879
Thomas Tierney		49	3-12	U. S.	Blindmaker	July 1, 1879		Died May 16, 1882
Hugh Macey		37	1	U. S.	Clerk	July 1, 1879	18 00	
John Q. Cobb		39	4-12	Ireland	Merchant	July 1, 1879		Sum. disch'gd, Sept. 11, 1879
William Meehan		55	1	U. S.	Carver	July 2, 1879	19 00	Deserted April 9, 1880
James Williams		46	7-12	Germany	Laborer	July 2, 1879		Deserted July 21, 1884
James Slivey		61	9-12	Ireland	Painter	July 2, 1879		Deserted March 23, 1881
Augustus Jacques		57	1-12	U. S.	Cabinet maker	July 2, 1879		
James Stafford		40	2	U. S.	Laborer	July 2, 1879		
John Winters		56	2	U. S.	Tanner	June 28, 1879	8 0	Sum. disch'gd, Sept. 15, 1879
Myron H. Denamore		38	3	Ireland	Stone cutter	July 2, 1879	8 0	Hon. disch'gd, Dec. 15, 1879
Joseph Seibler		50	7-12	U. S.	Farmer	July 26, 1879		Deserted September 23, 1879
George Achter		57	2-12	U. S.	Painter	July 2, 1879		Deserted December 1, 1880
Charles Elmendorf		41	3	Germany	Baker	June 27, 1879		Sum. disch'gd, March 13, 1880
Hugh Burns		48	1	U. S.	Laborer	June 8, 1879		
John A. Smith		62	2	France	Rheumatism	June 17, 1879		Sum. disch'gd, Dec. 1, 1880
Joshua Speckerman		62	3	U. S.	Rheumatism	June 22, 1879		Sum. disch'gd, Dec. 1, 1880
Leonard P. Moeler		54	3-12	Ireland	Frozen hands	July 22, 1879		
John Sullivan		60	6-12	U. S.	Cooper	July 30, 1879		
Edward Toot		31	1-12	U. S.	Carpenter	July 24, 1879		
James Allen		52	6-12	U. S.	Blacksmith	Aug. 4, 1879		Hon. disch'gd, Aug. 6, 1879
John Duff		60	1-12	Ireland	Rheumatism	Aug. 13, 1879		
Charles White		41	4-12	Ireland	Gunshot wound	Aug. 2, 1879	2 00	Hon. disch'gd, May 31, 1883
John D. Cooper		56	3	Scotland	Rheumatism	July 22, 1879		Hon. disch'gd, April 12, 1880
Patrick Cannon		50	1-12	Germany	Gunshot wound	Aug. 6, 1879		
Lawrence Farrell		49	6-12	England	General debility	Aug. 2, 1879		Sum. disch'gd, July 26, 1884
Andrew Turley		42	9-12	Ireland	Shell wound	Aug. 4, 1879		Deserted Nov. 9, 1880
Edward Cuddy		33	4-12	Ireland	Rheumatism	Aug. 6, 1879		Hon. disch'gd, March 29, 1880
Herman W. Jndson		52	7-12	Ireland	Rheumatism	July 17, 1879		Died January 22, 1884
			3	U. S.	Varicose veins	July 23, 1879		Hon. disch'gd, April 7, 1880
			9-12	U. S.	Frozen feet	July 25, 1879		Hon. disch'gd, April 7, 1881
					Heart disease	July 25, 1879		

LIST OF INMATES ADMITTED — Continued.

NAMES.	Co.	Regiment.	Age.	Service.	Disability.	Admitted.	Pension.	Remarks.
Patrick Doyle.	I A	93 New York Inf.	56	3-12	Gunshot wound.	July 18, 1879	\$10 00	Hon. disch'd, July 17, 1880
James H. Mitchell.	I A	91 New York Inf.	48	8-12	Chr. Rheumatism	Aug. 2, 1879		Deserted February 16, 1880
	I K	53 New York Inf.	52	1-12	Shell wound.	July 8, 1879	10 00	Sum. disch'd, June 16, 1880
	I K	97 New York Inf.	42	1-12	Nervousness	July 27, 1879		Deserted April 5, 1884
	I H	60 New York Inf.	42	1-12	Loss of arm	Aug. 2, 1879		Deserted September 18, 1879
	I H		37	4-12	Asthma	July 17, 1879		Hon. disch'd, June 3, 1884
	I A		51	4-12	Gunshot wound.	Aug. 1, 1879		Hon. disch'd, Aug. 4, 1883
	I A		35	8-12	Hernia	July 10, 1879		Deserted August 19, 1879
	I A		62	1-12	Gunshot wound.	Aug. 14, 1879	2 00	Deserted November 16, 1883
	I K		43	1-12	Phthisis	July 16, 1879		Died September 4, 1879
	I K		67	1-12	Gunshot wound	July 28, 1879	4 00	Hon. disch'd, Sept. 9, 1879
	I C		62	7-12	Varicose veins	Sept. 9, 1879		
	I C		46	2	Gunstroke	Aug. 13, 1879		Hon. disch'd, Oct. 7, 1882
	I C		49	3-12	Rheumatism	Aug. 14, 1879		Deserted April 10, 1882
	I C		60	3-12	General debility	July 8, 1879		
	I C		39	3-12	Chr. Rheumatism	Aug. 12, 1879		Sum. disch'd, Dec. 26, 1882
	I D		66	1-12	Hernia	Sept. 8, 1879		Sum. disch'd, May 15, 1884
	I D		50	1-12	Rheumatism	Aug. 8, 1879		Hon. disch'd, May 1, 1883
	I D		63	3-12	Vertigo	Sept. 8, 1879		
	I A		34	3-12	Paralysis	Aug. 19, 1879		Deserted September 16, 1880
	I A		49	1	Varicose veins	July 17, 1879		
	I B		34	4-12	Gunstroke	Sept. 6, 1879		Hon. disch'd, Nov. 19, 1879
	I B		69	1-12	Malaria fever	Aug. 12, 1879		Deserted January 1, 1881
	I B		49	3-12	Hernia	Aug. 6, 1879		Deserted June 5, 1880
	I C		41	1-12	Gunshot wound	Aug. 22, 1879		
	I C		40	1-12	Hernia	Aug. 9, 1879	4 00	Hon. disch'd, March 6, 1880
	I C		40	2-12	Gunshot wound	Sept. 14, 1879		
	I C		34	8-12	Rheumatism	Aug. 27, 1879		Deserted January 26, 1881
	I C		36	3-12	Malaria fever	Sept. 12, 1879		Hon. disch'd, April 10, 1880
	I C		36	7-12	Typhoid fever	Aug. 13, 1879		Sum. disch'd, June 24, 1880
	I C		36	3-12	Malaria fever	Sept. 4, 1879		
	I C		62	1-12	Deafness	Aug. 27, 1879		Hon. disch'd, June 1, 1882
	I C		62	1-12	Bronchitis	Aug. 27, 1879		Died November 10, 1881
	I C		48	3-12	Hernia	July 18, 1879		
	I C		59	3-12	Phthisis	Sept. 3, 1879		
	I C		59	3-12	Rheumatism	Aug. 7, 1879		
	I C		73	3-12	Phthisis	Aug. 28, 1879		
	I C		47	3-12	Gunshot wound	Aug. 14, 1879		
	I C		61	11-12	Chr. Diarrhoea	Aug. 21, 1879		
	I C		56	4	Shell wound	Aug. 27, 1879		
	I C		67	3	Tumor	Sept. 2, 1879		
	I C		44	3-12	Gunshot wound	Aug. 16, 1879		Deserted March 11, 1881
	I C		54	1-12	Gunshot wound	Aug. 10, 1879	13 00	Hon. disch'd, Aug. 9, 1881
	I C		64	2-12	Machineist	Aug. 9, 1879		Sum. disch'd, March 11, 1880
	I C		39	2-12	Painter	Aug. 12, 1879		Died March 10, 1881
	I C		39	2-12	Barber	Aug. 9, 1879		Hon. disch'd, March 20, 1880
	I C		43	7-12	Farmer	Aug. 9, 1879		Hon. disch'd, Sept. 24, 1880
	I C		61	3-12	Farmer	Aug. 10, 1879		Hon. disch'd, March 20, 1884
	I C		61	3-12	Clerk	Aug. 10, 1879		Hon. disch'd, April 12, 1880
	I C		61	3-12	Paper maker	Sept. 6, 1879		

Hon. disch'd, March 1, 1880
Hon. disch'd, June 5, 1881
Hon. disch'd, June 28, 1880
Sum. disch'd, Oct. 20, 1880
Deserted May 17, 1881
Died September 17, 1883
Hon. disch'd, June 23, 1881
Died March 11, 1880
Hon. disch'd, March 5, 1881
Hon. disch'd, Sept. 9, 1881
Hon. disch'd, March 22, 1880
Died April 30, 1880
Hon. disch'd, Oct. 4, 1880
Deserted August 9, 1884
Deserted May 15, 1880
Hon. disch'd, Dec. 30, 1879
Died October 26, 1883
Sum. disch'd, June 13, 1880
Deserted August 22, 1880
Sum. disch'd, March 11, 1880
Hon. disch'd, April 3, 1880
Deserted October 17, 1881

Sept. 11, 1879	Farmer	U. S.	1-12	42
Sept. 8, 1879	Musician	U. S.	3-12	43
Sept. 3, 1879	Tanner	U. S.	11-12	45
Sept. 6, 1879	Carrier	U. S.	1-12	46
Aug. 19, 1879	Tailor	U. S.	10-12	48
Aug. 10, 1879	Mechanic	U. S.	11-12	49
July 23, 1879	Laborer	U. S.	1-12	50
Sept. 16, 1879	Bricklayer	U. S.	1-12	51
July 16, 1879	Carpenter	U. S.	1-12	52
Aug. 16, 1879	Driver	U. S.	1-12	53
Sept. 14, 1879	Tinsmith	U. S.	1-12	54
Sept. 20, 1879	Wire worker	U. S.	1-12	55
Sept. 2, 1879	Butcher	U. S.	1-12	56
Sept. 14, 1879	Laborer	U. S.	1-12	57
Sept. 11, 1879	Cabinet maker	U. S.	1-12	58
Sept. 16, 1879	Laborer	U. S.	1-12	59
Aug. 20, 1879	Waiter	U. S.	1-12	60
Sept. 23, 1879	Tinsmith	U. S.	1-12	61
Sept. 17, 1879	Carpenter	U. S.	1-12	62
Sept. 18, 1879	Farmer	U. S.	1-12	63
Sept. 20, 1879	Tobaccoist	U. S.	1-12	64
Sept. 19, 1879	Seaman	U. S.	1-12	65
Sept. 23, 1879	Laborer	U. S.	1-12	66
Sept. 2, 1879	Shoemaker	U. S.	1-12	67
Sept. 26, 1879	Seaman	U. S.	1-12	68
Sept. 24, 1879	Plasterer	U. S.	1-12	69
Sept. 18, 1879	Farmer	U. S.	1-12	70
Sept. 26, 1879	Laborer	U. S.	1-12	71
Sept. 27, 1879	Carpenter	U. S.	1-12	72
Sept. 21, 1879	Cooper	U. S.	1-12	73
Sept. 27, 1879	Farmer	U. S.	1-12	74
Oct. 9, 1879	Laborer	U. S.	1-12	75
Oct. 5, 1879	Tinsmith	U. S.	1-12	76
Sept. 27, 1879	Laborer	U. S.	1-12	77
Sept. 27, 1879	Laborer	U. S.	1-12	78
Sept. 27, 1879	Carpenter	U. S.	1-12	79
Sept. 28, 1879	Mason	U. S.	1-12	80
Sept. 29, 1879	Coppersmith	U. S.	1-12	81
Sept. 31, 1879	Laborer	U. S.	1-12	82
Sept. 29, 1879	Gardener	U. S.	1-12	83
Sept. 30, 1879	Tailor	U. S.	1-12	84
Sept. 30, 1879	Fireman	U. S.	1-12	85
Oct. 1, 1879	Baker	U. S.	1-12	86
Oct. 1, 1879	Machinist	U. S.	1-12	87
Oct. 1, 1879	Artist	U. S.	1-12	88
Oct. 2, 1879	Clerk	U. S.	1-12	89
Oct. 3, 1879	Laborer	U. S.	1-12	90
Oct. 3, 1879	Farmer	U. S.	1-12	91
Oct. 3, 1879	Carpenter	U. S.	1-12	92
Oct. 3, 1879	Stone cutter	U. S.	1-12	93
Oct. 6, 1879	Stone mason	U. S.	1-12	94
Oct. 6, 1879	Plasterer	U. S.	1-12	95

Thomas O'Connell	C. P.	42
Richard A. Perry	D. M.	43
Robert Dwyer	F. D.	45
John Brothers	D. M.	46
Andrew Lyon	U. M.	48
Charles F. Thurston	U. M.	49
Michael Kelly	A. B.	50
John J. Travers	E. B.	51
John Stoll	E. B.	52
Anton Weitz	E. B.	53
John McConville	A. A.	54
James Dunn	A. A.	55
Frederick Sutton	C. K.	56
Alexander McCauley	C. K.	57
Christian Wambacher	G. O.	58
Henry Paul	G. O.	59
Daniel Quinn	H. H.	60
Frederick Wies	H. H.	61
John C. Van Huysen	B. I.	62
James Loo	B. I.	63
Charles A. Amldown	L. I.	64
Isaac Jacobson	L. I.	65
Amory Bishop	H. O.	66
Charles Thompson	H. O.	67
Michael O'Connell	E. I.	68
Marlin O'Connor	E. I.	69
Lawrence Phillips	O. S.	70
William Murphy	L. F.	71
Thomas Kearna	L. F.	72
Dennis McCarthy	G. I.	73
Theodore Horst	G. I.	74
Henry Bender	Lds.	75
Charles Sedon	Lds.	76
Joseph Lutz	B. D.	77
James E. Gahaba	A. A.	78
William Newman	A. A.	79
Augustus Borchert	F. B.	80
William B. Aldrich	F. B.	81
Terrence Sweeney	G. I.	82
Isaac Buxee	G. I.	83
Geo. L. P. Cook	G. I.	84
Thomas Duff	F. D.	85
James M. McCarthy	I. C.	86
John Bernhart	I. C.	87
William Moore	A. D.	88
Adam F. Record	A. D.	89
Adam Stelneck	A. D.	90
David Borg	A. B.	91
Julius Mast	I. I.	92
John Atkins	I. I.	93
Seigman Hirsch	C. F.	94
John Callahan	C. F.	95
Josephus Dingman	E. I.	96
George McPhie	E. I.	97
Gabriel Ranger	E. I.	98
Michael McDonough	E. I.	99
Wm. Langley	E. I.	100

LIST OF INMATES ADMITTED -- Continued.

NAME.	Co.	Regiment.	Age.	Service.	Nativity.	Occupation.	Disability.	Admitted.	Pen- sions.	Remarks.
Charles H. Hamilton.....	M	3 New York Cav.....	47	4 4-12	Canada.....	Tinsmith.....	Lumbago.....	Oct. 6, 1879	.....	Deserted April 26, 1882
John Kinchald.....	F	69 New York Inf.....	63	4 2-12	Ireland.....	Laborer.....	Varicose veins.....	Oct. 7, 1879	.....	Died February 29, 1884
James C. Subers.....	A	73 New York Inf.....	46	4 1-12	U. S.....	Painter.....	Rheumatism.....	Oct. 7, 1879	.....
John W. Heil.....	I	51 New York Inf.....	51	11-12	Germany.....	Laborer.....	Dyspepsia.....	Oct. 8, 1879	.....
John Munzel.....	F	53 New York Inf.....	59	3 10-12	Germany.....	Laborer.....	Hernia.....	Oct. 8, 1879	.....
George H. Kirchener.....	F	58 New York Inf.....	70	3 5-12	Germany.....	Gardener.....	Hernia.....	Oct. 8, 1879	.....
John Egan.....	K	56 New York Cav.....	54	1 3-12	Ireland.....	Ship sawyer.....	Gunshot wound.....	Oct. 8, 1879	.....	Sum. disch'ged, May 10, 1880
John Johnson.....	K	18 New York Cav.....	50	3 1 5-12	U. S.....	Laborer.....	Blindness.....	Oct. 9, 1879	.....	Sum. disch'ged, Oct. 29, 1883
Henry Hirsh.....	K	160 New York Inf.....	60	1 5-12	Germany.....	Laborer.....	Gunshot wound.....	Oct. 9, 1879	3 00	Hon. disch'ged, Oct. 23, 1879
Thomas Pollock.....	B	8 United States Inf.....	45	3 5-12	U. S.....	Hostler.....	Loss of leg.....	Oct. 9, 1879	.....
Patrick Maguire.....	G	1 New York Inf.....	50	4 5-12	Ireland.....	Printer.....	Diarthra.....	Oct. 10, 1879	.....	Sum. disch'ged, April 10, 1880
William O'Donnell.....	Lds.	United States Navy.....	34	3 1-12	Ireland.....	Laborer.....	Ulcer of leg.....	Oct. 10, 1879	.....	Hon. disch'ged, May 12, 1884
Edward Lynch.....	A	138 New York Inf.....	42	1 6-12	Ireland.....	Currier.....	Gunshot wound.....	Oct. 10, 1879	4 00	Hon. disch'ged, May 22, 1882
Peter Gaes.....	D	91 New York Inf.....	56	1 7-12	Belgium.....	Tailor.....	Gunshot wound.....	Oct. 13, 1879	4 00	Sum. disch'ged, June 15, 1880
John Conuerty.....	Lds.	United States Navy.....	36	1 3-12	U. S.....	Hatter.....	Loss of arm.....	Oct. 13, 1879	24 00	Hon. disch'ged, Mar. 15, 1880
John McLaughlin.....	C	42 New York Inf.....	41	1 2 5-12	Ireland.....	Laborer.....	Hernia.....	Oct. 14, 1879	7 6 00	Hon. disch'ged, Mar. 11, 1880
Christopher Turner.....	K	4 New York H. A.....	36	2 5-12	Ireland.....	Painter.....	Gunshot wound.....	Oct. 14, 1879	.....	Deserted December 21, 1879
Michael Riedelbach.....	A	29 New York Inf.....	50	1 5-12	Germany.....	Brewer.....	Varicocle.....	Oct. 15, 1879	.....	Hon. disch'ged, May 8, 1880
Anthony Smith.....	M	16 New York H. A.....	60	1 8-12	U. S.....	Farmer.....	Rheumatism.....	Oct. 15, 1879	.....	Died October 6, 1883
Daniel Collins.....	E	7 United States Inf.....	60	8 2 9-12	Ireland.....	Clerk.....	Rheumatism.....	Oct. 17, 1879	10 00	
Jacob D. Ancona.....	I	6 New York Bat.....	37	2 3 4-12	England.....	Laborer.....	Loss of arm.....	Oct. 21, 1879	18 00	Hon. disch'ged, Dec. 26, 1879
James D. White.....	E	75 New York Inf.....	76	3 2 4-12	England.....	Stone mason.....	Erysipelas.....	Oct. 21, 1879	12 00	Sum. disch'ged, June 15, 1880
John Ryan, 4th.....	G	91 New York Inf.....	33	3 11-12	Ireland.....	Laborer.....	Loss of arm.....	Oct. 21, 1879	24 00	Sum. disch'ged, Dec. 15, 1879
John C. Packard.....	F	91 New York Inf.....	60	3 4-12	U. S.....	Printer.....	General debility.....	Oct. 21, 1879	.....	Deserted October 23, 1883
Thomas Horan.....	F	71 New York Inf.....	45	3 1 2-12	Ireland.....	Plasterer.....	Gunshot wound.....	Oct. 21, 1879	.....	Deserted January 23, 1881
Hermann Bauer.....	K	53 New York Inf.....	44	1 2 4-12	Germany.....	Barber.....	Injury to leg.....	Oct. 22, 1879	.....	Hon. disch'ged, Dec. 10, 1880
William Milne.....	O. S.	United States Navy.....	39	2 10-12	Scotland.....	Seaman.....	Weakness of eyes.....	Oct. 22, 1879	.....	Hon. disch'ged, Jan. 30, 1880
Charles H. Starr.....	C	100 New York Inf.....	40	4 1-12	U. S.....	Laborer.....	Fracture of arm.....	Oct. 22, 1879	8 00	Hon. disch'ged, Nov. 1, 1879
Daniel Cass.....	I	105 New York Inf.....	53	4 1-12	Germany.....	Stone cutter.....	Shell wound.....	Sep. 3, 1879	.....
Louis Tabut.....	O. S.	United States Navy.....	52	4 3 1-12	France.....	Seaman.....	Paralysis.....	Oct. 7, 1879	.....
Henry Roehl.....	H	97 New York Inf.....	66	3 1-12	Germany.....	Laborer.....	Hernia.....	Oct. 13, 1879	.....	Hon. disch'ged, Nov. 7, 1879
Timothy Madigan.....	K	77 New York Inf.....	52	2 10-12	Ireland.....	Farmer.....	Heart disease.....	Oct. 13, 1879	.....	Hon. disch'ged, Nov. 19, 1880
James Hogan.....	B	23 Illinois Inf.....	56	1 4-12	Ireland.....	Laborer.....	Lumbago.....	Oct. 23, 1879	.....	Died December 5, 1879
Samuel Whitaker.....	B	160 New York Inf.....	58	3 4 7-12	England.....	Moulder.....	Chr. rheumatism.....	Oct. 24, 1879	.....	Died April 29, 1880
Philip Hart.....	C	78 New York Inf.....	34	4 3 1-12	Ireland.....	Laborer.....	Injury to hip.....	Oct. 24, 1879	8 00	Hon. disch'ged, Feb. 9, 1883
James C. Norton.....	K	76 New York Inf.....	34	3 3 1-12	U. S.....	Farmer.....	Gunshot wound.....	Oct. 27, 1879	.....	Deserted April 28, 1881
Richard Todd.....	A	59 New York Inf.....	63	3 2 1-12	Ireland.....	Baker.....	Gunshot wound.....	Oct. 27, 1879	.....	Sum. disch'ged, Feb. 6, 1882
Conrad Scheller.....	K	91 New York Inf.....	72	3 1-12	Germany.....	Shepherd.....	Hernia.....	Oct. 30, 1879	.....
Dennis Casey.....	E	13 Pennsylvania Cav.....	52	2 9-12	Ireland.....	Laborer.....	Injury to side.....	Oct. 30, 1879	.....
John Cunningham.....	C	174 New York Inf.....	58	2 2 8-12	Ireland.....	Laborer.....	Rheumatism.....	Oct. 30, 1879	.....
James Magarity.....	A	14 New York Cav.....	57	2 3 7-12	Ireland.....	Laborer.....	Disease of eyes.....	Nov. 1, 1879	.....	Hon. disch'ged, Jan. 23, 1880
Lot Swift.....	H	78 New York Inf.....	56	3 1 7-12	U. S.....	Mechanic.....	Chr. rheumatism.....	Nov. 3, 1879	.....	Hon. disch'ged, May 6, 1884
Jacob Zachman.....	E	16 New York H. A.....	62	1 3 9-12	Germany.....	Cooper.....	Cystitis.....	Nov. 3, 1879	.....
Charles T. Brady.....	K	11 New York S. M.....	48	3 2 9-12	U. S.....	Laborer.....	Concussion.....	Nov. 4, 1879	8 00	Sum. disch'ged, Mar. 11, 1880
William Alexander.....	G	69 New York Inf.....	38	2 1-12	Scotland.....	Currier.....	Gunshot wound.....	Nov. 4, 1879	18 00	Sum. disch'ged, Dec. 13, 1879
Henry J. McGrane.....	D	164 New York Inf.....	38	3 10-12	U. S.....	Sailor.....	Gunshot wound.....	Nov. 5, 1879	6 00	Hon. disch'ged, Dec. 16, 1879
Daniel Krakohl.....	D	7 New York Inf.....	52	1 9-12	Germany.....	Shoemaker.....	Gunshot wound.....	Nov. 6, 1879	.....
Jacob Abolt.....	U	21 New York Inf.....	67	1 9-12	Germany.....	Farmer.....	Gunshot wound.....	Nov. 7, 1879	.....	Hon. disch'ged, Nov. 24, 1879

Jacob Rabbett.	153 New York Inf.	2	10-12	Ireland.	Laborer.	Nov. 7, 1879	12 00	Hon. disch'ged, Feb 21, 1881
George Mettler.	33 New York Inf.	1	8-12	Germany.	Printer.	Nov. 7, 1879		Deserted August 16, 1880
James McCauley.	13 New York Inf.	1	1-12	U. S.	Laborer.	Nov. 10, 1879		Deserted October 28, 1881
Alexander S. Toplany.	6 New York H. A.	2	1-12	Hungary.	Medical.	Nov. 11, 1879		Deserted February 28, 1880
James Healy.	16 New York Inf.	1	8-12	Ireland.	Baker.	Nov. 19, 1879		Sum. disch'ged, Dec. 15, 1879
Michael Shukle.	4 New York H. A.	1	9-12	Ireland.	Laborer.	Nov. 20, 1879		Hon. disch'ged, May 10, 1880
Edward Tompkins.		2	10-12	Holland.	Farmer.	Nov. 22, 1879		
Ephraim Whitney, Jr.		1	10-12	U. S.	Farmer.	Nov. 12, 1879		Deserted December 14, 1879
Edward H. Parr.		1	11-12	U. S.	Shoemaker.	Nov. 13, 1879		Hon. disch'ged, March 18, 1880
Alfred C. Gaut.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		Deserted March 22, 1882
Henry Atherton.		1	11-12	U. S.	Carpenter.	Nov. 17, 1879		1883
Hugh Moran.		1	11-12	U. S.	Painter.	Nov. 17, 1879		1880
Joseph Helzel.		1	11-12	U. S.	Farmer.	Nov. 17, 1879		1880
Edward Cope.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
William Barnard.		1	11-12	U. S.	Moulder.	Nov. 17, 1879		1880
Samuel Kelly.		1	11-12	U. S.	R. R. engineer.	Nov. 17, 1879		1880
Alexander Fleming.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Patrick Conway.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Isaac Morrell.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Delevan Newkirk.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Max Steger.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Charles Selver.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Christian Brandt.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Thomas Farrell.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Montgomery Miller.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Justus A. Rutherford.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
David M. McLaughlin.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
John Bicker.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Michael Tighe.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
James Feeney.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Frederick Hoffman.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Frank Smith.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
James C. Carr.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
David Russell.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
William Welsh.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
George H. Francis.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Charles Walmsley.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Thomas Hawks.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Nathaniel Gorman.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Ferdinand Russell.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Mitchell D. Grogan.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Cary Beigrave.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
John Thomey.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Dennis Ambrose.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Gilbert H. May.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Thomas M. Higgins.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Daniel Kehoe.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
John D. Waters.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Thomas Gore.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Charles H. Counciler.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Charles McGlelland.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
William Davenport.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Thomas H. McGinn.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
Anthony Lynch.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
John W. Snyder.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880
George Roemer.		1	11-12	U. S.	Laborer.	Nov. 17, 1879		1880

LIST OF INMATES ADMITTED--Continued.

James Flynn	A	3-12	Ireland	Farmer	Mar. 3, 1880	4 00	Hon. disch'd, Jan. 19, 1881
Christian Fiesner	D	4-12	Germany	Tailor	Feb. 27, 1880	4 00	Deserted May 21, 1881
Joseph G. Gilman	Q	9-12	U. S.	Tailor	Mar. 6, 1880	4 00	Hon. disch'd, Apr. 4, 1882
Jacob Dennis	H	1-12	U. S.	Laborer	Mar. 10, 1880	4 00	Hon. disch'd, June 24, 1880
Godfrey Lodge	P	3-12	England	Laborer	Mar. 11, 1880	4 00	Sum. disch'd, June 24, 1880
Philip Tuite	B	3-12	Ireland	Plasterer	Mar. 18, 1880	4 00	Died April 23, 1883
Marcus Smith	G	11-12	Norway	Shoemaker	Mar. 18, 1880	4 00	Sum. disch'd, July 17, 1880
John Purcell	H	1-12	Ireland	Shoemaker	Mar. 18, 1880	4 00	Sum. disch'd, Sept. 24, 1884
Joseph Hurling	B	3-12	Germany	Laborer	Mar. 19, 1880	4 00	Deserted Sept. 16, 1881
Andrew Flack	A	1-12	Germany	Cabinet maker	Mar. 23, 1880	4 00	Deserted May 15, 1880
Jacob Annann	C	10-12	Germany	Shoemaker	Mar. 23, 1880	4 00	1882
Weld Downer	O	4-12	U. S.	Farmer	Mar. 23, 1880	4 00	1880
John Barrett	D	3-12	Canada	Soldier	Mar. 24, 1880	4 00	1880
Uralo Radocoolyevits	H	3-12	Austria	Chair maker	Mar. 24, 1880	4 00	1880
John Bell	C	3-12	Ireland	Farmer	Mar. 24, 1880	4 00	1880
Dennis Herlen	O	3-12	U. S.	Bookbinder	Mar. 27, 1880	4 00	1880
Robert D. Beckalew	H	4-12	Ireland	Laborer	Mar. 27, 1880	4 00	1880
Patrick Dolan	B	1-12	Ireland	Laborer	Mar. 29, 1880	4 00	1880
John Felghery	H	3-12	Ireland	Laborer	Mar. 29, 1880	4 00	1880
Chas. H. Houser	K	3-12	Ireland	Laborer	Mar. 30, 1880	4 00	1880
Andrew McCutcheon	E	10-12	Germany	Laborer	Apr. 1, 1880	4 00	1880
Theodore Wilson	D	3-12	U. S.	Cabinet maker	Apr. 1, 1880	4 00	1880
Wm. J. Hawley	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Wm. Beunle	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
William Gibbs	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
John Sherman	D	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
James Hickey	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Joseph Dowling	C	3-12	U. S.	Laborer	Apr. 1, 1880	4 00	1880
Wm. H. Farrell	H	3-12	U. S.	Porter	Apr. 1, 1880	4 00	1880
Peter Solomon	A	3-12	U. S.	Soldier	Apr. 1, 1880	4 00	1880
James McElroy	O	3-12	U. S.	Boatman	Apr. 1, 1880	4 00	1880
Chas. Ratze	I	3-12	U. S.	Clerk	Apr. 1, 1880	4 00	1880
John L. Dennison	H	3-12	Holland	Machine	Apr. 1, 1880	4 00	1880
Arthur Steward	B	3-12	France	Gunsmith	Apr. 1, 1880	4 00	1880
Edward Osborne	B	3-12	England	Farmer	Apr. 1, 1880	4 00	1880
Christopher O'Connor	P	3-12	U. S.	Hostler	Apr. 1, 1880	4 00	1880
Matthew Mulhearn	P	3-12	U. S.	Laborer	Apr. 1, 1880	4 00	1880
Edward Banks	P	3-12	U. S.	Boatman	Apr. 1, 1880	4 00	1880
Eugene A. Kleeman	C	3-12	U. S.	Sailor	Apr. 1, 1880	4 00	1880
James Housley	G	3-12	U. S.	Tailor	Apr. 1, 1880	4 00	1880
Philip Flander	O	3-12	U. S.	Confectioner	Apr. 1, 1880	4 00	1880
Francis Van Bok	I	3-12	U. S.	Clerk	Apr. 1, 1880	4 00	1880
Daniel Stark	B	3-12	U. S.	Butcher	Apr. 1, 1880	4 00	1880
Peter Deegan	I	3-12	U. S.	Butcher	Apr. 1, 1880	4 00	1880
Joseph Muller	O	3-12	U. S.	Laborer	Apr. 1, 1880	4 00	1880
Samuel Todd	P	3-12	U. S.	Shoemaker	Apr. 1, 1880	4 00	1880
Jacob Hager	P	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Wm. H. Drummond	X	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Thompson Edwards	G	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Dennis Fitzpatrick	A	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Fred. Graham	O	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Patrick H. Hughes	A	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Eugene Keiterbord	A	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Joseph Wetzel	O	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Peter Donahue	D	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
James Flynn	A	3-12	Ireland	Farmer	Mar. 3, 1880	4 00	Hon. disch'd, Jan. 19, 1881
Christian Fiesner	D	4-12	Germany	Tailor	Feb. 27, 1880	4 00	Deserted May 21, 1881
Joseph G. Gilman	Q	9-12	U. S.	Tailor	Mar. 6, 1880	4 00	Hon. disch'd, Apr. 4, 1882
Jacob Dennis	H	1-12	U. S.	Laborer	Mar. 10, 1880	4 00	Hon. disch'd, June 24, 1880
Godfrey Lodge	P	3-12	England	Laborer	Mar. 11, 1880	4 00	Hon. disch'd, June 24, 1880
Philip Tuite	B	3-12	Ireland	Plasterer	Mar. 18, 1880	4 00	Died April 23, 1883
Marcus Smith	G	11-12	Norway	Shoemaker	Mar. 18, 1880	4 00	Sum. disch'd, July 17, 1880
John Purcell	H	1-12	Ireland	Shoemaker	Mar. 18, 1880	4 00	Sum. disch'd, Sept. 24, 1884
Joseph Hurling	B	3-12	Germany	Laborer	Mar. 19, 1880	4 00	Deserted Sept. 16, 1881
Andrew Flack	A	1-12	Germany	Cabinet maker	Mar. 23, 1880	4 00	Deserted May 15, 1880
Jacob Annann	C	10-12	Germany	Shoemaker	Mar. 23, 1880	4 00	1882
Weld Downer	O	4-12	U. S.	Farmer	Mar. 23, 1880	4 00	1880
John Barrett	D	3-12	Canada	Soldier	Mar. 24, 1880	4 00	1880
Uralo Radocoolyevits	H	3-12	Austria	Chair maker	Mar. 24, 1880	4 00	1880
John Bell	C	3-12	Ireland	Farmer	Mar. 24, 1880	4 00	1880
Dennis Herlen	O	3-12	U. S.	Bookbinder	Mar. 27, 1880	4 00	1880
Robert D. Beckalew	H	4-12	Ireland	Laborer	Mar. 27, 1880	4 00	1880
Patrick Dolan	B	1-12	Ireland	Laborer	Mar. 29, 1880	4 00	1880
John Felghery	H	3-12	Ireland	Laborer	Mar. 29, 1880	4 00	1880
Chas. H. Houser	K	3-12	Ireland	Laborer	Mar. 30, 1880	4 00	1880
Andrew McCutcheon	E	10-12	Germany	Laborer	Apr. 1, 1880	4 00	1880
Theodore Wilson	D	3-12	U. S.	Cabinet maker	Apr. 1, 1880	4 00	1880
Wm. J. Hawley	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Wm. Beunle	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
William Gibbs	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
John Sherman	D	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
James Hickey	B	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Joseph Dowling	C	3-12	U. S.	Laborer	Apr. 1, 1880	4 00	1880
Wm. H. Farrell	H	3-12	U. S.	Porter	Apr. 1, 1880	4 00	1880
Peter Solomon	A	3-12	U. S.	Soldier	Apr. 1, 1880	4 00	1880
James McElroy	O	3-12	U. S.	Boatman	Apr. 1, 1880	4 00	1880
Chas. Ratze	I	3-12	U. S.	Clerk	Apr. 1, 1880	4 00	1880
John L. Dennison	H	3-12	Holland	Machine	Apr. 1, 1880	4 00	1880
Arthur Steward	B	3-12	France	Gunsmith	Apr. 1, 1880	4 00	1880
Edward Osborne	B	3-12	England	Farmer	Apr. 1, 1880	4 00	1880
Christopher O'Connor	P	3-12	U. S.	Hostler	Apr. 1, 1880	4 00	1880
Matthew Mulhearn	P	3-12	U. S.	Laborer	Apr. 1, 1880	4 00	1880
Edward Banks	P	3-12	U. S.	Boatman	Apr. 1, 1880	4 00	1880
Eugene A. Kleeman	C	3-12	U. S.	Sailor	Apr. 1, 1880	4 00	1880
James Housley	G	3-12	U. S.	Tailor	Apr. 1, 1880	4 00	1880
Philip Flander	O	3-12	U. S.	Confectioner	Apr. 1, 1880	4 00	1880
Francis Van Bok	I	3-12	U. S.	Clerk	Apr. 1, 1880	4 00	1880
Daniel Stark	B	3-12	U. S.	Butcher	Apr. 1, 1880	4 00	1880
Peter Deegan	I	3-12	U. S.	Butcher	Apr. 1, 1880	4 00	1880
Joseph Muller	O	3-12	U. S.	Laborer	Apr. 1, 1880	4 00	1880
Samuel Todd	P	3-12	U. S.	Shoemaker	Apr. 1, 1880	4 00	1880
Jacob Hager	P	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Wm. H. Drummond	X	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Thompson Edwards	G	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Dennis Fitzpatrick	A	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Fred. Graham	O	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Patrick H. Hughes	A	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Eugene Keiterbord	A	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Joseph Wetzel	O	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880
Peter Donahue	D	3-12	U. S.	Farmer	Apr. 1, 1880	4 00	1880

LIST OF LIMBATES ADMITTED — Continued.

NAME	Co.	Regiment	Age	Service	Nativity	Occupation	Disability	Admitted	Pen- sions	Remarks
George Matthews	D	10 New York Cav	72	1-12	U S	Farmer	Injury to leg	May 20, 1860	1000	
William G. Lemley	D	75 New York Inf.	64	6-12	Germany	Blacksmith		May 20, 1860	1000	
Henry Arthkamp	D	7 New York H A	49	2-10-12	Ireland	Laborer		May 20, 1860	1000	
John Nolan	D	50 New York Inf.	52	2-10-12	U S	Modeller		May 21, 1860	1000	
James H. Atkins	D	41 New York Inf.	56	2-10-12	Germany	Carpenter		May 25, 1860	1000	
Richard Ennis	D	136 New York Inf.	61	2-10-12	Ireland	Farmer		May 25, 1860	1000	
Thomas Perry	D	14 United States Inf.	39	2-10-12	U S	Farmer		May 25, 1860	1000	
Blanche A. Vreder	D	66 New York Inf.	78	2-10-12	Germany	Stone cutter		May 25, 1860	1000	
William Walsh	D	28 New York Inf.	66	2-10-12	Ireland	Blacksmith		May 25, 1860	1000	
John Gallagher	D	51 New York Inf.	66	2-10-12	U S	Farmer		May 25, 1860	1000	
Daniel W. Loring	D	45 New York Inf.	63	2-10-12	U S	Farmer		May 25, 1860	1000	
Robert Hogan	D	60 New York Inf.	63	2-10-12	U S	Farmer		May 25, 1860	1000	
Horace Hoppel	D	14 New York H A	41	2-10-12	U S	Printer		May 25, 1860	1000	
Martin Hartan	D	24 New York Inf.	56	2-10-12	Ireland	Laborer		May 25, 1860	1000	
Devin Donovan	D	157 New York Inf.	66	2-10-12	Ireland	Laborer		May 25, 1860	1000	
John Broe	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Charles Kelley	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Patrick Korman	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Thomas Korman	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Wm H. Wheeler	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Robert Shaw	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Timothy Driscoll	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Daniel Moss	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Edward Nolan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
James O'Callahan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Martin J. Purbo	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Charles Harrowsky	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
John Leonard	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Michael Kelly	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Richard W. Rogers	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
William A. Fisher	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
George Matthews	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
William G. Lemley	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Henry Arthkamp	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
John Nolan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
James H. Atkins	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Richard Ennis	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Thomas Perry	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Blanche A. Vreder	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
William Walsh	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
John Gallagher	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Daniel W. Loring	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Robert Hogan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Horace Hoppel	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Martin Hartan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Devin Donovan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
John Broe	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Charles Kelley	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Patrick Korman	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Thomas Korman	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Wm H. Wheeler	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Robert Shaw	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Timothy Driscoll	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Daniel Moss	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Edward Nolan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
James O'Callahan	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Martin J. Purbo	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Charles Harrowsky	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
John Leonard	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Michael Kelly	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
Richard W. Rogers	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	
William A. Fisher	D		66	2-10-12	U S	Laborer		May 25, 1860	1000	

Morris O'Sullivan	162 New York Inf.	40	11-12	Ireland	1	1890	Sum. disch'gd, Sept. 20, 1890
Hubert E. Jennison	16 Massachusetts Inf.	60	6-12	U. S.	1	1890	Hon. disch'gd, Mar. 26, 1891
John Callahan	8 New York Cav.	60	3-12	Ireland	3	1890	Died, July 8, 1894
Nelson Traver	101 New York Inf.	34	3-12	U. S.	1	1890	Deserted, March 31, 1891
Nicholas Dowling	15 New York H. A.	42	6-12	Ireland	1	1890	Deserted, August 4, 1893
Michael Holden	3 New York Art.	38	4-12	Ireland	1	1890	
Wm A. Gunning	United States Navy	39	3-12	U. S.	3	1890	Sum. disch'gd, Aug. 21, 1890
William Hill	173 New York Inf.	41	2-12	U. S.	2	1890	Hon. disch'gd, Sept. 6, 1891
Francis R. Crandall	141 New York Inf.	36	10-12	Ireland	1	1890	Sum. disch'gd, Sept. 29, 1890
William Glackin	34 New York Inf.	40	10-12	Ireland	1	1890	Deserted, Oct. 2, 1891
Thomas Creed	1 Conn. Cav.	64	3-12	Ireland	3	1890	
Philip Tully	69 New York Inf.	45	6-12	Ireland	2	1890	Died, June 30, 1892
Alexander E. Silvers	104 New York Inf.	68	2-12	Ireland	2	1890	Deserted, February 7, 1891
Francis Schlegel	21 New York Inf.	49	4-12	U. S.	4	1890	Sum. disch'gd, Oct. 2, 1892
Jacob Miller	20 Massachusetts Inf.	64	1-12	Germany	1	1890	Died, October 20, 1890
Joseph Froelich	3 Prov. Cav.	34	7-12	Germany	1	1890	Died, February 22, 1891
William Eason	67 Ohio Inf.	37	2-12	U. S.	2	1890	Hon. disch'gd, Feb. 15, 1893
Thomas Brady	82 New York Inf.	47	10-12	Ireland	4	1890	Died, June 16, 1892
Daniel Wagner	123 New York Inf.	51	7-12	France	2	1890	
John Hundley	67 New York Inf.	62	1-12	Ireland	1	1890	Hon. disch'gd, April 16, 1891
Charles Schraeder	8 New York Inf.	59	4-12	Germany	4	1890	Hon. disch'gd, April 4, 1891
Owen Williams	1 Conn. Inf.	63	1-12	U. S.	1	1890	Sum. disch'gd, April 22, 1891
William Burger		38	7-12	Ireland	1	1890	Died, Dec. 18, 1890
James Dalton		61	3-12	U. S.	3	1890	Sum. disch'gd, Sept. 16, 1890
James R. Murray		44	2-12	U. S.	2	1890	Deserted, September 22, 1890
William Johnson		60	3-12	U. S.	3	1890	
Sylvanus Durham		64	1-12	U. S.	1	1890	
Chas. T. Muller		40	6-12	Switzerland	2	1890	
Henry Bernard		60	7-12	Switzerland	2	1890	
Sebastian Wickham		71	5-12	U. S.	1	1890	
Rufus Eobbin		40	10-12	Ireland	2	1890	
Jackson Doyle		67	2-12	U. S.	2	1890	
William Shannon		56	3-12	Germany	3	1890	
Edward B. Lewis		49	2-12	U. S.	2	1890	
Charles Ulrich		56	3-12	Germany	3	1890	
Joseph Gersier		47	3-12	Germany	3	1890	
Frank Lavamie		57	3-12	Germany	3	1890	
Valentine Kert		46	3-12	Germany	3	1890	
Samuel M. Seaman		33	3-12	U. S.	3	1890	
John S. Sheldon		69	10-12	U. S.	10	1890	
Pius Kilinger		65	10-12	Germany	10	1890	
James Cunningham		44	3-12	Ireland	3	1890	
Marlin Matt		54	4-12	Ireland	4	1890	
James W. Curdle		55	3-12	Switzerland	3	1890	
William Winmet		66	3-12	Germany	3	1890	
Gottlieb Bentelsbacher		50	1-12	Germany	1	1890	
August Lorwe		62	1-12	Germany	1	1890	
Jacob Schmidt		40	6-12	Germany	6	1890	
Frederick Roehlt		62	6-12	Germany	6	1890	
Frederick Drentler		43	5-12	Germany	5	1890	
Charles Mansfield		78	2-12	Ireland	2	1890	
Augustus Bashold		53	2-12	Ireland	2	1890	
Edward O'Brien		42	6-12	Canada	6	1890	
George Barry		36	1-12	U. S.	1	1890	
Robert B. Fitzgerald							
Patrick Gerrity							

LIST OF LIMBES ADMITTED — Continued.

Regiment.	Age.	Service.	Nativity.	Occupation.	Disability.	Admitted.	Pension.	Remarks.
New York Inf.	39	3-12	Ireland.	Stone cutter	General debility.	Oct. 6, 1860		Died November 12, 1862
New York Inf.	39	2-12	U. S.	Farmer	Gunshot wound.	Oct. 6, 1860	\$10 00	Hon. disch'd Dec. 11, 1860
New York Inf.	33	2-12	U. S.	Moulder	Gunshot wound.	Oct. 6, 1860	18 00	Hon. disch'd, Nov. 8, 1860
New York Inf.	34	3	Ireland.	Cooper	Gunshot wound.	Oct. 13, 1860		
New York Inf.	34	3-12	Germany.	Shoemaker	Injury to hand.	Oct. 11, 1860		Hon. disch'd, April 4, 1863
New York Inf.	35	3-12	U. S.	Painter.	Gunshot wound.	Oct. 12, 1860		Hon. disch'd, Dec. 27, 1860
New York Inf.	35	3-12	Switzerland	Butcher.	Injury to leg.	Oct. 15, 1860		Hon. disch'd, March 18, 1861
New York Inf.	35	3-12	Ireland.	Silver plater	Gunshot wound.	Oct. 16, 1860		Deserted January 4, 1863
New York Inf.	31	4-12	U. S.	Laborer.	Heart disease.	Oct. 14, 1860		Hon. disch'd, Nov. 14, 1860
New York Inf.	37	10-12	U. S.	Carpenier	Acute orchitis.	Oct. 18, 1860		
New York Inf.	37	3-12	U. S.	Tailor	Chr. rheumatism.	Oct. 18, 1860		Died April 3, 1863
New York Inf.	34	1-12	U. S.	Brewer	Phthisis.	Oct. 20, 1860		Deserted January 1, 1861
New York Inf.	37	3-12	U. S.	Farmer.	Phthisis.	Oct. 20, 1860		Deserted December 26, 1860
New York Inf.	30	3-12	U. S.	Cook.	Chr. rheumatism.	Oct. 25, 1860		Died April 30, 1864
New York Inf.	47	11-12	England.	Grocer.		Oct. 25, 1860		
New York Inf.	44	6-12	Ireland.	Laborer		Oct. 27, 1860		
New York Inf.	45	6-12	U. S.	Shoemaker		Oct. 27, 1860	8 00	
New York Inf.	44	6-12	Wales	Weaver	Hernia.	Oct. 28, 1860		
New York Inf.	39	4-12	Ireland.	Laborer	Rheumatism.	Oct. 29, 1860		
New York Inf.	61	3-12	U. S.	Farmer.	Bronchitis.	Oct. 31, 1860		
New York Inf.	36	1-12	Ireland.	Sailor.	Bronchitis.	Nov. 2, 1860		
New York Inf.	44	3-12	England.	Butcher.	Heart disease.	Nov. 2, 1860		
New York Inf.	40	3-12	U. S.	Bookkeeper	Loss of arm.	Nov. 5, 1860		
New York Inf.	34	7-12	U. S.	Farmer.	Injury to side.	Nov. 5, 1860		
New York Inf.	46	11-12	Ireland.	Laborer	Loss of arm.	Nov. 6, 1860		
New York Inf.	52	3-12	U. S.	Farmer.	Injury to hand.	Nov. 8, 1860		
New York Inf.	44	3-12	U. S.	Seamster	Loss of sight.	Nov. 8, 1860		
New York Inf.	35	3-12	Canada	Clerk.	Hernia.	Nov. 10, 1860		
New York Inf.	35	3-12	U. S.	Millwright.	Hernia.	Nov. 10, 1860		Deserted December 31, 1860
New York Inf.	67	11-12	U. S.	Painter.	Crydriped.	Nov. 10, 1860		Hon. disch'd, May 24, 1861
New York Inf.	71	3-12	U. S.	Clerk.		Nov. 12, 1860	3 00	
New York Inf.	40	3-12	U. S.	Laborer		Nov. 12, 1860		Hon. disch'd Jan. 6, 1864
New York Inf.	47	3-12	Ireland.	Laborer		Nov. 12, 1860	3 00	
New York Inf.	35	3-12	U. S.	Sailor	Injury to leg.	Nov. 13, 1860		
New York Inf.	35	3-12	U. S.	Butcher	Asbma.	Nov. 16, 1860		
New York Inf.	45	3-12	U. S.	Marble cutter		Nov. 25, 1860		
New York Inf.	44	3-12	England	Hostler	Gunshot wound.	Nov. 17, 1860	3 00	
New York Inf.	43	3-12	Ireland.	Laborer	Rheumatism.	Nov. 18, 1860		
New York Inf.	56	10-12	Ireland.	Shoemaker	Injury to arm.	Nov. 19, 1860		
New York Inf.	62	4-12	France	Stove moulder.		Nov. 19, 1860		
New York Inf.	44	1-12	U. S.	Jeweller.		Nov. 19, 1860		
New York Inf.	43	2-12	Scotland	Teamster		Nov. 20, 1860		
New York Inf.	39	3-12	England	Butter		Nov. 20, 1860		
New York Inf.	46	3-12	Ireland.	Laborer		Nov. 20, 1860		
New York Inf.	37	1-12	U. S.	Blacksmith		Nov. 22, 1860		
New York Inf.	36	3-12	Ireland.	Laborer		Nov. 22, 1860		
New York Inf.	34	10-12	Germany	Carpenier		Nov. 22, 1860	2 00	Died December 27, 1860

Thomas Max
Julius S. Kent

William Mathews	K	2-12	Ireland	Farmer	23, 1890	Immigrated February 6, 1884
Owen O'Connor	K	2-12	U. S.	Laborer	Nov. 23, 1890	Imm. disch'd, March 1, 1893
Merritt Wheeler	K	11-12	U. S.	Cook	Nov. 23, 1890	Imm. disch'd, March 1, 1893
Henry A. Meek	K	2-12	U. S.	Laborer	Nov. 23, 1890	Imm. disch'd, March 1, 1893
Robert Ketriz	C	6-12	Germany	Laborer	Nov. 23, 1890	
Joseph Miles	O	6-12	Germany	Carpenter	Nov. 24, 1890	
Thomas Lanegoth	B	10-12	U. S.	Mariner	Nov. 24, 1890	
Edward Gates	I	10-12	U. S.	Painter	Nov. 26, 1890	
Knock W. Kenyon	B	2-12	U. S.	Baker	Nov. 26, 1890	
Michael Keeler	M	6-12	Germany	Laborer	Nov. 27, 1890	
Philip O'Bryan	A	11-12	Ireland	Laborer	Nov. 28, 1890	
Martin Rupp	D	2-12	Germany	Brewer	Nov. 28, 1890	
John Bean	B	1-12	U. S.	Hostler	Nov. 30, 1890	
William Kennedy	H	1-12	Ireland	Laborer	Nov. 30, 1890	
George Andrews	H	2-12	U. S.	Moulder	Nov. 30, 1890	
George Miller	G	1-12	U. S.	Painter	Nov. 30, 1890	
Franklin Carris	H	1-12	U. S.	Farmer	Dec. 1, 1890	
George N. Barber	H	1-12	U. S.	Laborer	Dec. 1, 1890	
Peter Rice	H	1-12	U. S.	Barber	Dec. 2, 1890	
William Mallova	G	1-12	U. S.	Laborer	Dec. 2, 1890	
Lewis Radloff	H	1-12	U. S.	Cook	Dec. 3, 1890	
Martin Sporn	H	1-12	U. S.	Carpenter	Dec. 3, 1890	
Thomas Delaney	D	1-12	U. S.	Farmer	Dec. 4, 1890	
George Hopfenack	H	1-12	U. S.	Engineer	Dec. 4, 1890	
William Hopkina	I	1-12	U. S.	Laborer	Dec. 7, 1890	
Amariah Oyler	I	1-12	U. S.	Shoemaker	Dec. 9, 1890	
John Kuth	B	1-12	U. S.	Farmer	Dec. 10, 1890	
Edward Dubois	H	1-12	U. S.	Tailor	Dec. 11, 1890	
Robert Lynch	H	1-12	U. S.	Farmer	Dec. 14, 1890	
Thomas C. Vance	B	1-12	U. S.	Laborer	Dec. 14, 1890	
George W. Beare	H	1-12	U. S.	Carpenter	Dec. 14, 1890	
Edward T. Rooney	K	1-12	U. S.	Painter	Dec. 14, 1890	
Michael McLevy	I	1-12	U. S.	Plasterer	Dec. 14, 1890	
John J. Schwalm	P	1-12	U. S.	Gardener	Dec. 14, 1890	
Albert Drenfahl	D	1-12	U. S.	Painter	Dec. 14, 1890	
Lonis Muller	P	1-12	U. S.	Blacksmith	Dec. 14, 1890	
Thomas Webb	D	1-12	U. S.	Baker	Dec. 15, 1890	
James Murray	G	1-12	U. S.	Laborer	Dec. 15, 1890	
John G. Zimmer	E	1-12	U. S.	Compositor	Dec. 16, 1890	
William Cole, Sr.	H	1-12	U. S.	Upholsterer	Dec. 16, 1890	
William Costello	B	1-12	U. S.	Tobaccoist	Dec. 16, 1890	
John Horne	G	1-12	U. S.	Laborer	Dec. 16, 1890	
John Bally	A	1-12	U. S.	Printer	Dec. 16, 1890	
Frederick Theurer	C	1-12	U. S.	Cook	Dec. 17, 1890	
Isaac Meeker	I	1-12	U. S.	Laborer	Dec. 17, 1890	
James Lee	I	1-12	U. S.	Shoemaker	Dec. 17, 1890	
James Langstaff	I	1-12	U. S.	Cooper	Dec. 17, 1890	
William E. Jones	L	1-12	U. S.	Farmer	Dec. 17, 1890	
Amidon Goodrich	L	1-12	U. S.	Barltender	Dec. 17, 1890	
Michael Clancy	C	1-12	U. S.	Clerk	Dec. 17, 1890	
David W. Carnie	C	1-12	U. S.	Carpenter	Dec. 17, 1890	
James Howe	C	1-12	U. S.	Tailor	Dec. 17, 1890	
Martin Grimm	C	1-12	U. S.	Laborer	Dec. 17, 1890	
James McAdam	P	1-12	U. S.	Painter	Dec. 17, 1890	
Deserted November 26, 1891						
Hon. disch'd, Jan. 12, 1894						
Hon. disch'd, Jan. 16, 1892						
Hon. disch'd, May 15, 1893						
Deserted June 6, 1894						
Died October 30, 1893						
Imm. disch'd, April 26, 1893						
Hon. disch'd, Mar. 14, 1893						
Hon. disch'd, April 18, 1893						
Hon. disch'd, March 14, 1894						
Med April 17, 1891						

LIST OF LIMBES ADMITTED — Continued.

Regiment.	Age.	Service.	Nativity.	Occupation.	Disease.	Admitted.	Pay.	Remarks.
149 New York Inf.	47	1-12	Germany.	Wagon maker.	Shell wound.	Dec. 21, 1860	\$6.00	Hon. disch'd, Mar. 20, 1861
79	40	4-12	Austria.	Riding master.		Jan. 1, 1861		
47	37	3	England.	Machinist.		Jan. 4, 1861		Sum. disch'd, Oct. 15, 1861
33	37	1-12	U. S.	Boatman.		Jan. 10, 1861		Deserted, Nov. 20, 1862
16	37	3	U. S.	Teamster.		Jan. 10, 1861	2.00	Sum. disch'd, Mar. 22, 1864
4 N. Y. Cavalry	43	2-12	U. S.	Farmer.		Jan. 10, 1861		
23 New York Inf.	40	2	U. S.	Teamster.		Jan. 12, 1861		Hon. disch'd, Apr. 4, 1863
36 New York Inf.	40	4-12	Ireland.	Fireman.		Jan. 13, 1861		
150 New York Inf.	36	3-12	Ireland.	Farmer.		Jan. 13, 1861		Sum. disch'd, May 23, 1863
6 New York H. A.	40	1-12	Ireland.	Farmer.		Jan. 14, 1861		Deserted April 12, 1862
2 New York L. A.	40	1-12	U. S.	Farmer.		Jan. 14, 1861		
131 New York Inf.	36	3-12	Germany.	Farmer.		Jan. 14, 1861		Sum. disch'd, April 4, 1864
30 Illinois Inf.	44	3-12	U. S.	Farmer.		Jan. 17, 1861		
146 New York Inf.	46	3-12	U. S.	Farmer.		Jan. 17, 1861		
94 New York Inf.	41	9-12	U. S.	Farmer.		Jan. 17, 1861		Sum. disch'd, Feb. 12, 1863
104 New York Inf.	40	10-12	U. S.	Farmer.		Jan. 17, 1861	3.00	Sum. disch'd, Apr. 10, 1863
41 New York Inf.	43	10-12	Ireland.	Farmer.		Jan. 17, 1861		Deserted Nov. 10, 1863
129 New York Inf.	41	10-12	Germany.	Farmer.		Jan. 20, 1861		
141 New York Inf.	41	10-12	Germany.	Farmer.		Jan. 20, 1861		Deserted October 21, 1863
1 New York Engineers.	43	1-12	Germany.	Farmer.		Jan. 20, 1861		Hon. disch'd, April 27, 1863
24 New York Cavalry	39	3-12	U. S.	Farmer.		Jan. 20, 1861		Deserted April 27, 1861
41 New York Cavalry	39	1-12	U. S.	Farmer.		Jan. 20, 1861		Deserted November 23, 1861
41 New York Inf.	36	1-12	U. S.	Farmer.		Jan. 20, 1861		Died March 9, 1861
116 New York Inf.	36	1-12	U. S.	Farmer.		Jan. 20, 1861		Deserted May 14, 1863
41 New York Inf.	36	1-12	U. S.	Farmer.		Jan. 20, 1861		Deserted April 17, 1864
4 New York Inf.	36	1-12	U. S.	Farmer.		Jan. 20, 1861		
147 New York Inf.	36	1-12	U. S.	Farmer.		Jan. 20, 1861		
28 Ohio Inf.	46	3-12	U. S.	Farmer.		Jan. 20, 1861		Died October 4, 1861
96 New York Inf.	43	3-12	U. S.	Farmer.		Jan. 20, 1861		Deserted October 30, 1863
13 New York H. A.	36	3-12	U. S.	Farmer.		Jan. 20, 1861		Hon. disch'd, Aug. 4, 1864
36 New York Inf.	40	3-12	U. S.	Farmer.		Jan. 20, 1861		
36 New York Inf.	40	3-12	U. S.	Farmer.		Jan. 20, 1861		Deserted, June 14, 1862
62 New York Inf.	36	3-12	U. S.	Farmer.		Jan. 20, 1861		Deserted July 20, 1861
36 New York Inf.	36	3-12	U. S.	Farmer.		Jan. 20, 1861		
3 New York L. A.	37	3-12	U. S.	Farmer.		Jan. 20, 1861		Hon. disch'd, May 1, 1863
United States Navy	36	3-12	U. S.	Farmer.		Jan. 20, 1861		Deserted, February 2, 1863
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		Sum. disch'd, Oct. 3, 1861
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		Hon. disch'd, Sept. 19, 1863
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		Hon. disch'd, Mar. 20, 1864
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		Deserted April 27, 1861
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		Hon. disch'd, April 22, 1861
	44	3-12	U. S.	Farmer.		Jan. 20, 1861	4.00	Deserted October 6, 1863
	44	3-12	U. S.	Farmer.		Jan. 20, 1861		Died January 4, 1864

Frank Nolan	F	57	2	9-12	Ireland	Moulder	Mar. 14, 1881	12 00	Died February 18, 1882
Philip Genzert	F	58	3	9-12	Germany	Shoemaker	Mar. 16, 1881		Sum. disch'gd, Sept. 14, 1881
Barney McGinn	F	59	3	10-12	Ireland	Laborer	Mar. 18, 1881		
Lorin Denmond	E	60	3	10-12	U. S.	Painter	Mar. 24, 1881		
Michael Deutech	E	61	3	10-12	U. S.	Cigar maker	Mar. 24, 1881		
Wm. H. Singleton	H	62	1	4-12	Germany	Painter	Mar. 24, 1881		
John Rogchouse	D	63	1	8-12	Germany	Laborer	Mar. 24, 1881		
Thomas Fairgreve	G	64	3	10-12	U. S.	Miner	Mar. 25, 1881		
Eara Sprague	G	65	3	4-12	U. S.	Clergyman	Mar. 25, 1881		
James E. Goode	E	66	3	11-12	England	Broom maker	Mar. 25, 1881	3 00	Sum. disch'gd, Mar. 8, 1884
John Wheeler	I	67	3	2-12	U. S.	Cabinet maker	Mar. 25, 1881		
Michael J. Brady	I	68	3	2-12	U. S.	Portier	Mar. 29, 1881		
Wm. Goodheart	E	69	3	2-12	U. S.	Painter	Mar. 29, 1881		
Frederick Koester	E	70	3	2-12	U. S.	Tailor	April 1, 1881		
Thomas Pritchard	E	71	3	1-12	Germany	Shoemaker	April 1, 1881		
Henry Eck	E	72	1	1-12	England	Boxmaker	April 6, 1881	8 00	Deserted Jan. 31, 1884
John McOatichy	E	73	4	3-12	Germany	Seaman	April 6, 1881		Died September 21, 1881
Martin Phillips	E	74	4	3-12	Ireland	Seaman	April 6, 1881	6 00	
Daniel Galvin	E	75	3	9-12	U. S.	Carpenter	April 8, 1881		
John McDewitt	B	76	3	1-12	Ireland	Cook	April 9, 1881		Died May 3, 1883
Owen O'Brien	B	77	1	6-12	Ireland	Machinist	April 9, 1881	4 00	Hon. disch'gd, April 30, 1881
Alex'r O. Cameron	K	78	3	6-12	Ireland	Laborer	April 10, 1881		
Jacob DeGraef	K	79	3	5-12	Scotland	Laborer	April 13, 1881		
James Karles	D	80	3	5-12	Holland	Tailor	April 19, 1881		Hon. disch'gd, Apr. 21, 1883
Martin O'Shannassy	D	81	1	3-12	England	Laborer	April 20, 1881		
William Chrysler	C	82	1	9-12	Ireland	Clerk	April 20, 1881		Died January 19, 1883
John O'Connell	A	83	3	3	U. S.	Farmer	April 25, 1881		Died, December 10, 1881
James Fitzsimmons	B	84	3	3	Ireland	Clerk	April 26, 1881	4 00	Discharged O. R. Oct. 28, 1883
Abner D. Graham	A	85	1	7-12	Ireland	Laborer	April 28, 1881		Dropped February 6, 1882
William H. Card	F	86	4	4	U. S.	Postman	April 29, 1881		Dropped September 8, 1882
William McGuire	E	87	3	3	U. S.	Laborer	April 30, 1881		Died, May 28, 1881
Alexander Gradenet	E	88	3	3	Ireland	Shoemaker	April 30, 1881		
Henry Craig	M	89	4	10-12	Germany	Bookbluder	April 30, 1881		
James Sullivan	G	90	3	3-12	Eng. and	Mason	May 2, 1881		
Charles Schmidt	G	91	3	3-12	Ireland	Laborer	May 2, 1881		Dropped Jan. 19, '82 (desert'd)
Michael Warner	E	92	1	9-12	Germany	Musician	May 3, 1881		Discharged O. R. Aug. 31, 1881
John J. Meyer	I	93	2	1	Germany	Farmer	May 3, 1881		
Charles Castle	A	94	2	2	Germany	Weaver	May 5, 1881		Discharged O. R. May 31, 1883
Frederick W. Crumpton	A	95	3	3	U. S.	Silver plater	April 7, 1881		
Jeremiah McCarthy	A	96	4	4	U. S.	Clerk	May 6, 1881		Dropped Oct. 2, '83 (deserted)
John Armstrong	F	97	3	3	Ireland	Laborer	May 10, 1881		
Isaac Bowman	D	98	3	3	Ireland	Laborer	May 11, 1881		Dropped May 15, '81, w/o deser't'n
Louis Morgandern	A	99	3	3	Switzerland	Carpenter	May 11, 1881		
William Egan	O	100	3	3	Germany	Clerk	May 12, 1881		Deserted Jan. 19, 1882
George Runkle	L	101	4	4	Ireland	Mason	May 12, 1881		Dropped Jan. 2, '83 (desert'd)
Leroy Humock	B	102	1	4-12	France	Teamster	May 12, 1881		
John Burke	A	103	3	3	U. S.	Laborer	May 14, 1881		Died September 13, 1881
James Sorahan	C	104	3	3	Ireland	Laborer	May 14, 1881		Discharged O. R. June 14, 1881
		105	3	3	U. S.	Teamster	May 14, 1881	6 00	Sum. disch'gd, Mar. 14, 1882
		106	3	3	U. S.	Teamster	May 15, 1881		Died April 10, 1882

LIST OF INMATES ADMITTED — Continued.

Co.	Regiment.	Age	Service.	Nativity.	Occupation.	Disability.	Admitted.	Pension.	Remarks.
A	33 New York Inf.	47	2	Ireland.	Laborer	Old age.	May 18, 1861		Discharged O. R. May 18, 1862
F	16 New York Bat.	65	1	U. S.	Miller		May 18, 1861		Deserted May 27, 1861
B	96 New York Inf.	57	3	Ireland.	Laborer		May 20, 1861		
E	94 New York Inf.	64	3	U. S.	Mason		May 20, 1861		Drop'd Feb. 23, '62 (deserted)
B	36 New York Inf.	46	2	U. S.	Shoemaker		May 23, 1861		
Q	47 New York Inf.	40	3	Ireland.	Laborer		May 26, 1861		
C	8 New York H. A.	36	2	Germany.	Mason		May 27, 1861		
I	30 New York Inf.	45	3	U. S.	Stone cutter		May 27, 1861		Discharged O. R. Dec. 10, 1861
I	171 New York Inf.	52	9-12	U. S.	Farmer	Paralysis	May 28, 1861		
H	12 New York Inf.	73	7-12	U. S.	Farmer	Bunafroke.	June 1, 1861		
H	2 Ohio Artillery	45	2	U. S.	Carpenter	Chr. Bronchitis & chr. Rheumatism	June 7, 1861		Discharged Sept. 7, 1862, O. R.
B	6 New York Cavalry	63	3-12	Switzerland.	Weaver	Double hernia.	June 7, 1861		
E	63 New York Inf.	36	3	U. S.	Laborer	Gunshot wound.	June 8, 1861		
D	25 New York Inf.	54	1	Ireland.	Moulder	left hip.	June 13, 1861		
E	102 New York Inf.	46	1	Ireland.	Carriage maker.		June 13, 1861	\$2 00	Discharged O. R. July 8, 1861
H	3 New York L. A.	63	1	U. S.	Farmer.		June 14, 1861		Dropped June 23, '62, deserted
H	157 New York Inf.	70	1	U. S.	Laborer		June 17, 1861	10 00	Died August 16, 1861
F	71 New York Inf.	66	4	U. S.	Laborer		June 21, 1861		Discharged July 23, 1861, O. R.
I	31 New York Inf.	57	2	Ireland.	Shoemaker	Hernia.	June 21, 1861		
Q	6 New York Cavalry	55	4	U. S.	Farmer.	Chr. Rheumatism	June 24, 1861		Discharged July 23, 1864, O. R.
A	14 New York Cavalry	64	1	England.	Brick layer	Asthma.	June 24, 1861		Discharged July 8, 1861, O. R.
E	35 New York Inf.	41	5	U. S.	Baker	Rheumatism.	June 24, 1861		Discharged Aug. 3, 1861, O. R.
F	13 New York H. A.	45	7-12	Canada.	Laborer	Chr. Rheumatism	June 24, 1861		Deserted January 31, 1862
Q	47 New York Inf.	41	1	Ireland.	Laborer	Disease of lungs.	June 25, 1861		Deserted September 16, 1862
Q	91 New York Inf.	48	11-12	Ireland.	Laborer	Fracture thigh.	June 25, 1861		
Band	6 United States Inf.	40	5	Ireland.	Rope maker	Gunshot wound & asthma	June 27, 1861		Discharged Sep. 29, 1861, O. R.
F	181 New York Inf.	52	1	U. S.	Farmer	Kidney disease.	June 28, 1861		Dropped Apr. 16, '63, desert'd
E	30 New York Inf.	35	2	U. S.	Halter	Rheumatism	June 28, 1861		Deserted April 9, '64, deserted
K	90 New York Inf.	60	5	Ireland.	Blacksmith	Chr. Rheumatism	June 28, 1861		
M	12 New York Cavalry	36	1	U. S.	Gardener		June 28, 1861		Died July 21, 1863
Q	17 New York Inf.	46	4	N. Bruns'wt	Shoemaker.		July 1, 1861		
B	1 New York Cavalry	56	1	U. S.	Engineer		July 2, 1861		
B	6 New York Bat.	54	3	Switzerland	Laborer		July 2, 1861		
A	10 New York Cavalry	35	1	U. S.	Agent		July 1, 1861		
B	46 New York Inf.	41	1	Germany	Turner		July 4, 1861	\$ 00	1861
C	8 United States Inf.	60	5	Holland.	Soldier		July 4, 1861		
E	75 New York Inf.	66	3	U. S.	Chk.		July 5, 1861	4 00	1861
C	17 New York Inf.	58	4	U. S.	Leather		July 8, 1861		
C	17 New York Inf.	58	4	U. S.	Leather		July 8, 1861		Deserted August 16, 1863

John Cook

Peter Kelly

Michael Lee

James Sullivan

James Tracy

Daniel Tully

Enoch Hitchcock

William De Groot

James Carney

Charles Ring

Dennis Sailer

John M. Kerr

John Merch

Charles E. Call

Michael Dockenberger

Louise Marcus

George F. Young

Amos Baudert

Edwin D. Cowles.	13 New York H. A.	H	61	9-12	U. S.	Physician.	July 6, 1881	8 00	Died March 25, 1888
George N. Palmer.	114 New York Inf.	E	51	1	U. S.	Stovemounter.	July 12, 1881		
Jonathan Conroy	14 New York Cavalry.	H	45	3	Ireland.	Laborer.	July 12, 1881	2 00	O. R. discharged Mar. 17, '82
Cornelius Cronin.	60 New York Inf.	Q	68	2	Ireland.	Walter.	July 13, 1881		
Eudolph Walter	78 New York Inf.	E	74	11-12	Switzerland	Baker.	July 16, 1881		Deserted August 11, 1883
William Blank	5 New York Inf.	D	58	4-12	Germany.	Machinist.	July 16, 1881		O. R. discharged Sep. 13, '81
Eugene Savage.	5 New York H. A.	B	35	11-12	U. S.	Riboe cutter.	July 18, 1881	14 00	O. R. discharged June 13, '82
Thomas H. Fennerty.	13 New York Ind. Bat.	B	45	1	U. S.	Painter.	July 18, 1881		
Rugh Shricey	25 New York Inf.	B	52	2	Ireland.	Laborer.	July 18, 1881		O. R. discharged Aug. 19, '81
Charles B. Young.	20 New York Inf.	F	40	3	U. S.	Carpenter.	July 20, 1881		Deserted July 10, 1882
Andrew Nelson	25 New York Inf.	F	69	4	Scotland	Tailor.	July 20, 1881		
Charles H. Law.	119 New York Inf.	A	65	7-12	Germany.	Teacher.	July 20, 1881		O. R. discharged May 23, '84
Samuel A. Jackling	75 New York Inf.	H	53	1	U. S.	Barber.	July 21, 1881		O. R. discharged Aug. 19, '81
Charles Unterbach	12 New York Cavalry.	D	70	2	France	Cabinet maker.	July 21, 1881		Deserted December 23, 1883
Edward J. Farrell	2 New York Inf.	D	37	2	Ireland.	Laborer.	July 21, 1881		Died, April 13, 1881
Frederick Hartung.	6 New York Inf.	D	53	4	Germany.	Cigar maker.	July 23, 1881		Sum. disch'd, March 9, 1883
James Hagenan.	74 New York Inf.	D	57	2	U. S.	Iron moulder.	July 25, 1881	4 00	O. R. discharged Oct. 10, '82
John Ransom.	4 New York H. A.	L	44	2	Canada	Laborer.	July 25, 1881		Deserted February 6, 1883
Lewis Gilbert.	100 New York Inf.	I	65	2	Canada	Laborer.	July 26, 1881		Deserted July 16, 1883
William Schang.	68 New York Inf.	Q	56	4	Germany.	Carver.	July 26, 1881		
John Roal.	32 New York Inf.	C	54	2	Germany.	Laborer.	July 26, 1881		O. R. discharged April 4, '82
Franklin Miller.	11 New York Cavalry.	I	48	3	Germany.	Foundryman.	July 30, 1881		Died June 29, 1883
Thomas Milton.	2 United States A.	B	47	7	Ireland.	Engineer.	Aug. 2, 1881		O. R. discharged Sept. 16, '81
Henry Bird.	6 New York Cavalry.	K	46	4	U. S.	Wheel maker.	Aug. 3, 1881	10 00	O. R. discharged Dec. 8, '81
John Stantenbocher.	37 New York Inf.	H	44	2	U. S.	Laborer.	July 29, 1881		Died December 17, 1881
Thomas Agan.	102 New York Inf.	G	53	4	Ireland.	Laborer.	Aug. 5, 1881		O. R. discharged April 16, '83
Joseph Ormsby.	131 New York Inf.	G	60	3	Ireland.	Laborer.	Aug. 6, 1881		Died June 29, 1882
George Mithall.	169 New York Inf.	E	43	2	Ireland.	Painter.	Aug. 8, 1881		O. R. discharged Sept. 16, '81
Charles Horn.	186 New York Inf.	H	38	9-12	U. S.	Farmer.	Aug. 11, 1881		O. R. discharged Dec. 8, '81
Cornelius Van Huisen.	58 New York Inf.	A	65	2	U. S.	Carpenter.	Aug. 11, 1881		
Patrick Purcell.	66 New York Inf.	H	51	3	Ireland.	Laborer.	Aug. 11, 1881		Deserted June 6, 1882
Frederick Bowman.	187 New York Inf.	I	44	10-12	Germany.	R. R. conductor.	Aug. 11, 1881		Died, May 7, 1884
William Van Ryan.	3 New York Art.	I	63	5-12	Holland	Teamster.	Aug. 12, 1881	16 00	Discharged O. R. Mar. 17, '82
Thomas Beatty.	4 New York Inf.	I	54	1	Ireland.	Laborer.	Aug. 16, 1881	16 00	Discharged O. R. Sept. 6, '81
James B. Randall.	23 New York Inf.	B	44	1	U. S.	Clerk.	Aug. 16, 1881		Dropped as deserter Jan. 3, '83
Marcus Jacobowicz.	13 New York Bat.	A	60	7-12	Prussia.	Furrier.	Aug. 16, 1881		
Henry C. Verkerke.		A	50	3	Holland	Baker.	Aug. 16, 1881		Discharged O. R. Aug. 20, '84
John Baker.		A	59	1	Germany.	Carpenter.	Aug. 17, 1881		"Drop'd as deserter", Feb. 21, '82
John Lynch.		F	59	1	Ireland.	Blacksmith.	Aug. 18, 1881		Drop'd as deserter Mar. 6, '83
Conrad Sager.		I	63	3	U. S.	Farmer.	Aug. 20, 1881		Deserted April 26, 1883
Thomas Barry.		D	46	1	Ireland.	Coachman.	Aug. 22, 1881		
William S. Mahon.		A	37	2	Ireland.	Basket maker.	Aug. 27, 1881		
Samuel Goes.		A	75	1	U. S.	Turner.	Aug. 27, 1881		
Andrew Honika.		E	62	2	Germany.	Laborer.	Aug. 27, 1881		
John F. Robinson.		D	41	3	U. S.	Printer.	Aug. 27, 1881		

LIST OF INMATES ADMITTED—Continued.

Co.	Regiment.	Age.	Service.	Nativity.	Occupation.	Injury to finger...	Admitted.	Pen- sion.	Remarks.
D	United States Navy...	44	3	C B	Mariner	Injury to finger...	Aug. 27, 1901	91 00	Discharged O. R. Dec. 2, 1902
D	121 New York Inf...	46	2	Germany	Farmer		Aug. 27, 1901	4 00	
D	95 New York Inf...	78	3	Ireland	Labourer		Aug. 27, 1901		
D	1 R. I. Artillery...	53	3	Ireland	Hostler		Aug. 27, 1901		Sam disch'ed, April 4, 1902
D	132 New York Inf...	45	3	Ireland	Shoemaker		Aug. 28, 1901		Sam disch'ed, Dec. 9, 1902
D	United States Navy...	65	4	U. S.	Seaman		Aug. 31, 1901		Discharged August 16, 1903
D	26 New York Inf...	64	4	U. S.	Farmer		Aug. 31, 1901		Discharged February 23, 1903
D	16 New York Inf...	46	1	U. S.	Carriage maker		Sept. 1, 1901		
D	6 New York Inf...	38	3	U. S.	Hotel keeper	Gunshot wound.	Sept. 1, 1901	1 00	
D	29 New York Inf...	37	3	U. S.	Painter	Right side...	Sept. 1, 1901		Discharged March 12, 1903
D	96 New York Inf...	56	3	England	Labourer	Second's eye...	Sept. 1, 1901		Discharged O. R. Feb. 20, 1904
D	4 New York Artillery...	70	3	U. S.	Labourer	Chr. Rheumatism	Sept. 4, 1901		Discharged June 14, 1902
D	6 New York Cavalry...	50	4	Germany	Painter	Chr. Rheumatism	Sept. 4, 1901		Discharged May 13, 1903
D	164 New York Inf...	68	3	Germany	Painter	Chr. Rheumatism	Sept. 4, 1901		
D	164 New York Inf...	26	3	Ireland	Operator	Hip disease.	Sept. 4, 1901		Died October 20, 1903
D	United States Navy...	26	3	Ireland	Clerk	Lung disease.	Sept. 4, 1901		
D	Reg. detachm't, U. S. A.	26	3	U. S.	Turnshoer	Paralysis	Sept. 7, 1901		
D	26 New York Inf...	46	1	U. S.	Painter	Paralysis	Sept. 20, 1901		Discharged O. R. Feb. 20, 1904
D	26 New York Battery...	68	3	Ireland	Labourer	Rheumatism.	Sept. 22, 1901	4 00	Discharged O. R. May 20, 1903
D	179 New York Inf...	38	3	U. S.	Farmer	Rheumatism.	Sept. 22, 1901		Discharged O. R. Feb. 7, 1903
D	1 New York Cavalry...	40	3	U. S.	Peeler	Chronic abscess	Sept. 22, 1901		Discharged October 11, 1902
D	179 New York Inf...	31	3	U. S.	Clerk	Paralysis	Sept. 22, 1901	6 00	Discharged February 1, 1903
D	179 New York Cavalry...	46	3	U. S.	Painter	Rheumatism.	Sept. 22, 1901		Discharged March 31, 1902
D	43 New York Inf...	50	3	U. S.	Clerk	Ulcer on left leg.	Sept. 22, 1901		Sam. disch'ed, May 2, 1903
D	1 New York Inf...	67	3	Ireland	Tailor	Injury of left hip	Sept. 22, 1901		Discharged March 27, 1904
D	1 New York L. A.	47	3	U. S.	Actor	Rheumatism.	Sept. 22, 1901		
D	3 New York H. A.	46	4	Ireland	Labourer	Hernia	Oct. 1, 1901		Died March 21, 1902
D	164 New York Inf...	39	3	U. S.	Farmer	Hernia	Oct. 1, 1901		Discharged April 13, 1904
D	164 New York Inf...	39	3	England	Labourer	Flies.	Oct. 1, 1901		Discharged January 20, 1903
D	United States Navy...	64	14	Ireland	Clerk	General debility	Oct. 1, 1901		Discharged October 20, 1903
D	61 New York Inf...	63	3	U. S.	Clerk	Rheumatism.	Oct. 1, 1901		Discharged May 17, 1903
D	109 New York Inf...	73	1	U. S.	Butcher	Congestion of the lungs.	Oct. 1, 1901		
D	21 New York Inf...	41	3	U. S.	Labourer	Rheumatic attack.	Oct. 12, 1901		
D	60 New York Inf...	66	4	U. S.	Clerk	Unshot wound.	Oct. 12, 1901	3 00	
D	1st New York Inf...	47	1	Ireland	Oldier	Deafness	Oct. 12, 1901	6 00	
D	2 New York Cavalry...	36	3	Germany	Member	Rheumatism	Oct. 12, 1901		1903
D	82 Pennsylvania Inf...	51	3	U. S.	Labourer	Injury to leg.	Oct. 12, 1901		1903
D	15 New York Inf...	43	3	Ireland	Labourer	Asthma	Oct. 12, 1901		1903
D	2 Connecticut Inf...	39	3	U. S.	Civil engineer	Fracture of ribs	Oct. 12, 1901		1903
D	16 New York Inf...	43	1	Ireland	Labourer	Lameness of left arm.	Oct. 12, 1901		Discharged March 9, 1902
D	173 New York Inf...	73	3	Ireland	Steam cutter	Wounded in left arm	Oct. 14, 1901		Discharged O. R. May 24, 1903
D	164 New York Inf...	26	1	Ireland	Shoemaker	General debility	Oct. 14, 1901	10 00	Discharged October 18, 1903
D	2 New York H. A.	46	1	U. S.	Postman	Wound in right head	Oct. 14, 1901		Discharged December 4, 1903

Edward Flaherty
James Coleman.
Amos Wilson

John Brown	C	10, New York Cavalry	44	2	7-12	U. S.	Blacksmith	Oct. 14, 1861	Disch'ged O. R. April 2, 1863
Walter Smith	H	176 New York Inf.	60	1	7-12	U. S.	Tanner	Oct. 21, 1861	Died November 11, 1862
Isaac C. Potter	I	1 New York Cavalry	64	4		U. S.	Farmer	Oct. 21, 1861	Disch'ged O. R. March 3, 1862
Charles Kolb	B	45 New York Inf.	37	1		Germany	Laborer	Oct. 21, 1861	
Jacob Hoffman	K	177 New York Inf.	40	1		Germany	Moulder	Oct. 21, 1861	
John H. Penn	A	131 New York Inf.	52	3		England	Painter	Oct. 21, 1861	
Michael Maunher	I	155 New York Inf.	42	3		Ireland	Laborer	Oct. 21, 1861	Sum. disch'gd, Dec. 22, 1861
John Klingebaefer	H		59			Germany	Mason	Oct. 21, 1861	Deserted February 7, 1863
Thomas McGorman	C		62	2	10-12	Ireland	Stone cutter	Oct. 21, 1861	
John C. Holmes	H		26	4	9-12	U. S.	Laborer	Oct. 31, 1861	
Henry W. Hitchcock	B		41	3	8-12	U. S.	Laborer	Oct. 31, 1861	82
Patrick Carby	I		42	13		Ireland	Tailor	Oct. 31, 1861	29, 1864
Michael Ryan	I		55	1	5-12	Ireland	Tailor	Oct. 31, 1861	862
William Ruckley	G		59	3		Germany	Laborer	Oct. 31, 1861	
Conrad Keim	A		68	3		U. S.	Mechanic	Oct. 31, 1861	
William Hooper	D		64	1	6-12	Ireland	Hatter	Oct. 31, 1861	Died April 18, 1864
Daniel McGrath	C		51	2		Germany	Laborer	Nov. 3, 1861	
George Henneberger	E		72	2	8-12	France	Brewer	Nov. 3, 1861	Disch'ged O. R. Dec. 31, 1861
John Wieland	H		43	2	7-12	U. S.	Cutler	Nov. 3, 1861	Deserted March 17, 1862
Jacob Y. Morse	H		63	1	6-12	Ireland	Stone cutter	Nov. 3, 1861	Died December 14, 1861
Thomas Robinson	E		47	1	10-12	Ireland	Carpenter	Nov. 11, 1861	Deserted December 6, 1861
Robert Galbreth	K		42	4		Ireland	Farmer	Nov. 11, 1861	Sum. disch'gd, Nov. 23, 1863
William H. Chase	K		49	1	8-12	U. S.	Shoemaker	Nov. 11, 1861	Disch'ged O. R. March 7, 1863
Edward F. Charles	H		50	1	9-12	Canada	Laborer	Nov. 11, 1861	Disch'ged O. R. April 6, 1863
John Fox	G		36	1		U. S.	Currier	Nov. 11, 1861	
Henry J. Huckins	H		35	1		U. S.	Mason	Nov. 11, 1861	1862
Thomas Murray	H		37	6		U. S.	Laborer	Nov. 11, 1861	1862
Moses Blair	G		34	1	6-12	Ireland	Laborer	Nov. 11, 1861	1863
James Buchanan	H		52	1		Ireland	Gardener	Nov. 17, 1861	1863
Michael Kirby	H		40	2	8-12	U. S.	Clerk	Nov. 17, 1861	
Gustave W. Ball	H		61	3	9-12	Ireland	Shoemaker	Nov. 17, 1861	1864
Patrick Lynch	G		53	3	8-12	Ireland	Cook	Nov. 17, 1861	
Joseph Quigley	F		67	1		U. S.	Machinist	Nov. 17, 1861	1862
James Foote	F		46	2	10-12	Ireland	Laborer	Nov. 17, 1861	1863
Thomas Connell	Q		56	1	8-12	U. S.	Farmer	Nov. 17, 1861	
Robert Park	Q		47	1	8-12	U. S.	Boatman	Nov. 17, 1861	
Joseph Huling	H		53	1	10-12	U. S.	Farmer	Nov. 23, 1861	Disch'ged O. R. Jan. 3, 1862
William I. Peters	K		61	1	8-12	Switzerland	Painter	Nov. 23, 1861	Died December 9, 1861
Casper Duttwyler	K		37	1	8-12	Ireland	Laborer	Nov. 23, 1861	Disch'ged O. R. April 25, 1863
Henry Miller	K		64	4	8-12	Ireland	Seaman	Nov. 23, 1861	Died, December 16, 1861
Charles Brown, 2nd	E		43	4		Ireland	Laborer	Nov. 23, 1861	Discharged
James Garney	C		44	3	8-12	U. S.	Farmer	Nov. 23, 1861	
Stephen K. Fisher	I		45	3	11-12	U. S.	Laborer	Nov. 23, 1861	Sum. disch'gd, April 6, 1862
George Managan	B		40	2		Germany	Wood turner	Nov. 23, 1861	O. R. disch'gd, Jan. 4, 1863
George Lovey	C		50	3		U. S.	Laborer	Nov. 23, 1861	O. R. disch'gd, Jan. 12, 1863
William R. Coates	G		38	3	10-12	U. S.	Carpenter	Nov. 23, 1861	
Robert R. Root	I		53	3		U. S.	Salesman	Nov. 23, 1861	Sum. disch'gd, April 7, 1863
Oscar Higgins	B		45	6		Ireland	Laborer	Nov. 23, 1861	O. R. disch'gd, Sept. 1, 1864
James Clear	E		51	3		U. S.	Horse farrier	Nov. 23, 1861	Deserted Feb 15, 1862
William McMiller	G		67	1	6-12	Ireland	Vanner	Nov. 23, 1861	Deserted December 7, 1862
William Gills	H		36	1		U. S.	Moulder	Nov. 23, 1861	O. R. disch'gd, May 13, 1862
Michael Klordan	I		46	3		U. S.	Tele. operator	Nov. 23, 1861	
Mortimer S. Andrews	I		46	3		U. S.		Nov. 23, 1861	

LIST OF INMATES ADMITTED -- Continued.

NAME.	Co.	Age.	Service.	Nativity.	Occupation.		Pen- altn.	Remarks.
Thomas Moran.	C	46	3-12	Ireland.	Laborer.			
Charles Boyle.	I	42	5-12	Ireland.	Laborer.			6, 1894
Charles H. Benham.	B	46	3	U. S.	Laborer.			1893
Benben V. Davis.	B	56	7-12	U. S.	Railroader.			1891
James Campbell.	D	45	3	Ireland.	Laborer.			
William Fleming.	D	45	3	Ireland.	Laborer.			1, 1894
Moses H. Lewis.	A	44	4	U. S.	Carpenter.			2, 1892
Charles H. Bevin.	M	38	9-12	U. S.	Farmer.			1892
Edward C. Claringdon.	K	61	1	England.	Gardener.			
Edward Croak.	A	39	1	Ireland.	Currier.			
John Daly.	A	39	1	Canada.	Cooper.			
Edward A. McKenna.	A	36	1	Ireland.	Farmer.			Died March 24, 1892
Cicero Canaday.	C	56	1	U. S.	Blacksmith.			
Ormond Dyer.	K	63	1	Canada.	Laborer.			
John Nichols.	K	52	4	Germany.	Mason.			
Conrad Kaufman.	A	56	4	Germany.	Rheumatism.			Disch'd O. R. April 10, 1894
Thomas Harvey.	D	36	3	Ireland.	Marble cutter.			Deserted December 18, 1893
John Gleason.	F	44	3	Ireland.	Boatman.			Sum. disch'd, July 26, 1894
Cornelius O'Leary.	F	59	3	Germany.	Engraver.			Deserted March 9, 1892
Romanus Boyl.	F	55	1	Germany.	Mason.			
Joseph Schierly.	E	60	1	Germany.	Cooper.			Sum. disch'd, Feb. 17, 1893
Joseph Schwartz.	E	64	1	Germany.	Gardener.			Sum. disch'd, Mar. 17, 1893
Sylvester Keller.	E	46	2	Germany.	Laborer.			Deserted March 17, 1893
Henry Melzer.	E	51	3	U. S.	Laborer.			Deserted May 17, 1893
Kenneth B. Johnston.	F	57	3	Ireland.	Laborer.			Deserted January 13, 1900
William Cunningham.	H	56	3	Ireland.	Laborer.			Sum. disch'd, April 2, 1892
Joseph Matthews.	I	57	3	Ireland.	Currier.			Deserted September 19, 1893
Frederick Schluchstein.	I	56	3	U. S.	Farmer.			
Daniel Prosser.	O	73	3	Ireland.	Laborer.			Deserted February 6, 1893
Martin Connor.	H	71	1	Ireland.	Laborer.			
Ortinal B. Scott.	H	71	1	Ireland.	Shoemaker.			Sum. disch'd, Mar. 2, 1893
Keward Conlin.	H	50	3	Ireland.	Cabinet maker.			
Thomas Crampton.	E	34	5	U. S.	Laborer.			Deserted August 11, 1892
Theodore Hensel.	O	60	2	England.	Laborer.			Died March 27, 1892
William H. Donnelly.	I	45	3	U. S.	Engraver.			
George Douglas.	A	45	3	U. S.	Boatman.			
John Verrugon.	B	40	4	U. S.	Clerk.			Deserted March 8, 1893
Charles A. Ellis.	H	63	2	Ireland.	Laborer.			Sum. disch'd, Feb. 17, 1893
James B. Hanley.	B	42	3	U. S.	Laborer.			Died March 20, 1892
Joseph Kram.	H	36	1	U. S.	Brush maker.			Deserted May 18, 1892
Thomas McNamee.	H	73	2	U. S.	Laborer.			Sum. disch'd, Aug. 23, 1892
Madison J. Scott.	D	42	3	U. S.	Painter.			O. R. disch'd April 4, 1893
Daniel Hotaling.	H	42	3	U. S.	Laborer.			
William Hegadorn.	H	42	3	U. S.	Laborer.			
Frederick O. Genth.	H	54	4	Germany.	Tailor.			
John A. Knop.	H	54	4	Germany.	Tailor.			

Francis Borchel.....	K	71	2	7-12	Germany	Baker..	2, 1882	Mar.	Disch'ged O. R. Sept. 11, '83	4 00	
Michael Connors.....	K	43	3	4-12	Ireland	Laborer	2, 1882	Mar.			
Stephen W. Wood.....	K	71	1	5-12	U. S.	Farmer	2, 1882	Mar.			
John Graham.....	A	65	1	9-12	Ireland	Laborer	2, 1882	Mar.			
Francis Snyder.....	O	65	1		U. S.	Laborer	2, 1882	Mar.			
Edward T. Johnson.....	D	41	3		U. S.	Printer	2, 1882	Mar.			
Patrick Riley.....	C	41	3		Ireland	Laborer	2, 1882	Mar.			
Harrison H. Wheeler.....	H	39	3	9-12	U. S.	Blacksmith	2, 1882	Mar.			
Bennett R. Robinson.....	M	35	1		U. S.	Laborer	2, 1882	Mar.			
David M. Norton.....	I	48	2		U. S.	Laborer	2, 1882	Mar.			
John Thomas.....		60	1	7-12	U. S.	Seaman	2, 1882	Mar.			
Frank Abick.....		43	1	8-12	Germany	Baker	2, 1882	Mar.			
Edward Brennan.....		62	3		Ireland	Cooper	2, 1882	Mar.			
Hugh O'Donnell.....		52	14	10-12	Ireland	Stone cutter	2, 1882	Mar.			
Leander Nelson.....		54	3	10-12	U. S.	Clear maker	2, 1882	Mar.			
Brick Halvorsen.....		62	3		Norway	Saddler	2, 1882	Mar.			
Edward S. Brunner.....		62	1		Bavaria	Tailor	2, 1882	Mar.			
John Cantry.....		39	4		Ireland	Soldier	2, 1882	Mar.			
William Van Auker.....		45	1	9-12	U. S.	Farmer	2, 1882	Mar.			
James Groper.....		36	3	10-12	U. S.	Farmer	2, 1882	Mar.			
Emil Goss.....		41	3		Germany	Laborer	2, 1882	Mar.			
James Vernon.....		45	3	8-12	Ireland	Laborer	2, 1882	Mar.			
Frank L. Haffey.....		52	4		U. S.	Cartman	2, 1882	Mar.			
Martin M. Nash.....		37	3	8-12	U. S.	Carriage maker	2, 1882	Mar.			
James Murphy.....		46	3		Ireland	Laborer	2, 1882	Mar.			
Casper Wetzel.....		56	4	1-12	Germany	Tailor	2, 1882	Mar.			
Thomas Mackin.....		52	1		Ireland	Moulder	2, 1882	Mar.			
Cornelius Keefe.....		36	5		U. S.	Laborer	2, 1882	Mar.			
Daniel McGinnis.....		57	1	10-12	Ireland	Seaman	2, 1882	Mar.			
William Finlayson.....		52	1		Spain	Cook	2, 1882	Mar.			
Christopher Farrell.....		63	6	4-12	Ireland	Rope maker	2, 1882	Mar.			
Joseph Maurer.....		54	1	4-12	Germany	Cigar maker	2, 1882	Mar.			
Robert Kennedy.....		64	3		Rugland	Wool spinner	2, 1882	Mar.			
Michael O'Brien.....		63	2	4-12	Ireland	Shoemaker	2, 1882	Mar.			
Thomas Hadnes.....		57	1		U. S.	Book binder	2, 1882	Mar.			
Christopher Zahn.....		49	4	3-12	Germany	Tinsmith	2, 1882	Mar.			
James Donovan.....		53	3		Ireland	Laborer	2, 1882	Mar.			
Carl Rick.....		61	3	6-12	Germany	Farmer	2, 1882	Mar.			
Lewis Rasch.....		47	4		Bavaria	Machinist	2, 1882	Mar.			
Thomas Ryan, 2d.....		75	1	8-12	Ireland	Engineer	2, 1882	Mar.			
William R. Hampton.....		57	4		U. S.	Carpenter	2, 1882	Mar.			
George Green.....		57	3	7-12	England	Carpenter	2, 1882	Mar.			
Thomas Powers.....		41	2		U. S.	Moulder	2, 1882	Mar.			
Walter Johnson.....		41	2	5-12	Ireland	Baker	2, 1882	Mar.			
James Oell.....		64	1		Scotland	Painter	2, 1882	Mar.			
John Sheppard.....		64	1	6-12	Germany	Gilder	2, 1882	Mar.			
Christian Spock.....		59	4		Ireland	Farmer	2, 1882	Mar.			
James Boyle.....		59	4		Ireland	Laborer	2, 1882	Mar.			
Thomas Kincheta.....		41	2	10-12	U. S.	Laborer	2, 1882	Mar.			
Hiram Morrison.....		56	1		U. S.	Farmer	2, 1882	Mar.			
Leonard Adams.....		46	3		U. S.	Carpenter	2, 1882	Mar.			
Rushford B. Hancock.....		41	4	1-12	U. S.	Printer	2, 1882	Mar.			
Beth L. Ford.....		46	3		Germany	Laborer	2, 1882	Mar.			
Ell Meneen Ellis.....		40	3		U. S.	Shoemaker	2, 1882	Mar.			
Charles B. Peterson.....		53	1		Ireland	Mason	2, 1882	Mar.			
Cornelius Henley.....		70	3		Germany	Silk manuf.	2, 1882	Mar.			
George Zincke.....											

Died February 10, 1883
Died April 25, 1883
Disch'ged O. R. April 24, 1882
Sum. disch'gd. March 16, 1882
Disch'ged O. R. Sept. 11, '83
Disch'ged O. R. May 21, 1884
Deserted April 14, 1883
Disch'ged O. R. April 24, '83
Disch'ged O. R. Sept. 16, 1884
Disch'ged O. R. July 13, 1882
Deserted December 27, 1882
Deserted October 8, 1882
Deserted May 17, 1883
Deserted August 15, 1883
1883
'84
'84

4 00
3 25
4 00
4 00
4 00
4 00
2 00
2 00
15 00

LIST OF INMATES ADMITTED--Continued.

NAME.	Co.	Regiment.	Age.	Years service.	Disability.	Admitted.	Pension.	Remarks.
Samuel Long.	H	104 New York Inf.	62	2 10-12	Heart disease	May 16, 1882	...	Died October 14, 1882
David Cummings.	B	4 New York Art.	55	2 10-12	Tumor	May 16, 1882	...	Discharged O. R. Oct. 12, 1882
Peter Anker.	Q	7 New York Inf.	44	1 11-12	Gunshot wound.	May 24, 1882	...	
Petrick Wenn.	Q	94 New York Inf.	53	3	Inflammation of ankle joint	May 24, 1882	62 00	Died July 24, 1883
John Moan.	M	5 New York Cav.	67	2 4-12	Partial blindness.	May 24, 1882	...	
Jonathan Ellis.	K	1 New York Engineers.	69	6-12	Malaria fever.	May 24, 1882	...	
William Seymour.	F	161 New York Inf.	67	9-12	Blood poisoning.	July 22, 1882	...	
James McGuire.	I	67 New York Inf.	80	4	Gunshot wound	Aug. 9, 1882	4 00	
James Kennedy.	C	43 New York Inf.	69	1		Aug. 9, 1882	...	Discharged O. R. Aug. 21, 1882
Charles O. Ingalls.	I	28 New York Inf.	44	2		Aug. 9, 1882	...	Discharged U. R. May 6, 1884
Jacob Geissel.	B	7 New York Inf.	55	1		Aug. 9, 1882	6 00	Discharged O. R. Apr. 23, 1883
Henry Hughes.	A	15 New York Engineers	67	2		Aug. 9, 1882	...	Died September 6, 1882
James Phelan.	A	14 Conn. Inf.	61	1 11-12		Aug. 9, 1882	...	
Frank Kraus.	K	125 New York Inf.	64	2 10-12		Aug. 9, 1882	...	Deserted April 26, 1884
Daniel Howard.	H	179 New York Inf.	42	2 10-12		Aug. 9, 1882	...	
Lewis Taylor.	Y	111 9 C. T.	41	2		Aug. 9, 1882	...	
Frederick Helling.	A	5 New York Art.	62	7-12		Aug. 9, 1882	...	
August Brinkerman.	C	1 New York Art.	67	3 1-12		Aug. 9, 1882	...	
Charles Neidwahi.	C	17 New York Art.	75	2 2-12		Aug. 9, 1882	...	
Charles Kolb.	A	8 New York Inf.	51	3		Aug. 9, 1882	...	
Charles Deigel.	C	68 New York Inf.	61	1 3-12		Aug. 9, 1882	...	Died November 6, 1883
Im S. Edwards.	A	165 New York Inf.	33	3 3-12		Aug. 9, 1882	...	
Horace Richardson.	D	75 New York Inf.	49	3 3-12		Aug. 9, 1882	...	
Jaramiah Loraline.	E	39 New York Inf.	54	4 4-12		Aug. 9, 1882	...	
Michael Smith.	H	13 New York Inf.	54	2 3-12	Hernia.	Aug. 9, 1882	2 00	Discharged O. R. May 12, 1884
John Downey.	B	11 New York Inf.	57	4 3-12	Gunshot wound, amp. right leg.	Aug. 9, 1882	...	Discharged O. R. Sept. 4, 1882
Ludwig Klein.	A	132 New York Inf.	62	2 10-12	Rheumatism.	Aug. 9, 1882	16 00	Discharged O. R. Nov. 13, 1883
John M. Force.	C		46	4 6-12	Impaired vision.	Aug. 9, 1882	...	
Charles Strong.	D		46	4 6-12	Rheumatism.	Aug. 9, 1882	...	
John Gilie.	D		37	3	Rheumatism.	Aug. 9, 1882	...	
William Bamberg.	L		62	9-12	General debility	Aug. 9, 1882	...	Discharged O. R. Aug. 28, 1883
Valentine Dornheimer.	C		40	1 10-12	Heart disease	Aug. 9, 1882	...	Died February 16, 1884
Charles Dalton.	B		40	2	Chr. bronchitis.	Aug. 9, 1882	3 00	Discharged O. R. Sept. 22, 1883
Herman Ernk.	D		43	4-12	Chr. bronchitis.	Aug. 9, 1882	...	Died July 23, 1883
Joseph L. Simpson.	A		36	10	Hemorrhoids	Aug. 9, 1882	...	Died December 19, 1882
Charles Newman.	A		41	9-12	Heart disease	Aug. 9, 1882	...	Deserted April 14, 1883
John Hemleron.	E		64	2		Aug. 9, 1882	...	
Charles West.	F	4 United States Art.	67	1		Aug. 9, 1882	...	
John D. Frost.	F		67	3		Aug. 9, 1882	...	
Henry Braun.	A	8 New York Inf.	45	7-12		Aug. 9, 1882	...	Discharged O. R. July 16, 1884
Herman Parr.	D	8 New York Inf.	49	2		Aug. 15, 1882	...	Discharged O. R. April 12, 1883
Christine Walbold.	F	46 New York Inf.	66	4		Aug. 15, 1882	...	
Alfred Power.	A	45 New York Inf.	67	4		Aug. 15, 1882	...	Died January 6, 1883
John Murphy.	F	69 New York Inf.	59	3-12	Loss of leg	Aug. 15, 1882	...	Discharged O. R. Nov. 11, 1883

Anthony Arbustuer	Disch'gd O. R. June 13, 1883	Aug. 18, 1882	18, 1882	4 00	Disch'gd O. R. April 30, 1883
Donald A. Campbell	Disch'gd O. R. April 30, 1883	Aug. 18, 1882	18, 1882	4 00	Disch'gd O. R. Sept. 12, 1882
John Carson	Disch'gd O. R. Sept. 12, 1882	Aug. 18, 1882	18, 1882	4 00	Disch'gd O. R. Oct. 11, 1883
George Gardner	Disch'gd O. R. Oct. 11, 1883	Aug. 18, 1882	18, 1882	4 00	Deserted February 24, 1883
James Ormond	Deserted February 24, 1883	Aug. 18, 1882	18, 1882	4 00	
Stephen Politt		Aug. 18, 1882	18, 1882	4 00	
Jacob L. Johnson		Aug. 18, 1882	18, 1882	4 00	
John Henry Meyer		Aug. 18, 1882	18, 1882	4 00	
David Scherman		Aug. 18, 1882	18, 1882	4 00	
John H. Steele		Aug. 18, 1882	18, 1882	4 00	
Thomas Cottrell		Aug. 18, 1882	18, 1882	4 00	
George Carnes		Aug. 18, 1882	18, 1882	4 00	
Patrick Brady		Aug. 18, 1882	18, 1882	4 00	
John Burns		Aug. 18, 1882	18, 1882	4 00	
Peter van Hergen		Aug. 18, 1882	18, 1882	4 00	
John Brennan		Aug. 18, 1882	18, 1882	4 00	
David Wilkins		Aug. 18, 1882	18, 1882	4 00	
William Dechene		Aug. 18, 1882	18, 1882	4 00	
Anton Vogelhang		Aug. 18, 1882	18, 1882	4 00	
George Gracy		Aug. 18, 1882	18, 1882	4 00	
Charles J. Hall		Aug. 18, 1882	18, 1882	4 00	
James Scott		Aug. 18, 1882	18, 1882	4 00	
Henry Mogler		Aug. 18, 1882	18, 1882	4 00	
John Kay		Aug. 18, 1882	18, 1882	4 00	
James Haight		Aug. 18, 1882	18, 1882	4 00	
Charles K. Emery		Aug. 18, 1882	18, 1882	4 00	
William Curry		Aug. 18, 1882	18, 1882	4 00	
Mathias Beckert		Aug. 18, 1882	18, 1882	4 00	
Henry Wernsdorfer		Aug. 18, 1882	18, 1882	4 00	
Vincent Schell		Aug. 18, 1882	18, 1882	4 00	
Michael Dwyer		Aug. 18, 1882	18, 1882	4 00	
Nathaniel F. H. Chenev.		Aug. 18, 1882	18, 1882	4 00	
Daniel G. Sparks		Aug. 18, 1882	18, 1882	4 00	
Francis X. Martin		Aug. 18, 1882	18, 1882	4 00	
Ephraim Jones		Aug. 18, 1882	18, 1882	4 00	
Robert G. Hawkins		Aug. 18, 1882	18, 1882	4 00	
John Conway		Aug. 18, 1882	18, 1882	4 00	
Daniel Johns		Aug. 18, 1882	18, 1882	4 00	
Otis B. Luce		Aug. 18, 1882	18, 1882	4 00	
David Scherman		Aug. 18, 1882	18, 1882	4 00	
James Cooney		Aug. 18, 1882	18, 1882	4 00	
John McCreary		Aug. 18, 1882	18, 1882	4 00	
John Kane		Aug. 18, 1882	18, 1882	4 00	
Phillip Collins		Aug. 18, 1882	18, 1882	4 00	
William H. King		Aug. 18, 1882	18, 1882	4 00	
Thomas Ryan, 3d		Aug. 18, 1882	18, 1882	4 00	
Joseph Mahon		Aug. 18, 1882	18, 1882	4 00	
Louis Rushtien		Aug. 18, 1882	18, 1882	4 00	
Charles Schwartz		Aug. 18, 1882	18, 1882	4 00	
Karl Kugel		Aug. 18, 1882	18, 1882	4 00	
John Mack		Aug. 18, 1882	18, 1882	4 00	
Eugene Ward		Aug. 18, 1882	18, 1882	4 00	
Thomas Russell		Aug. 18, 1882	18, 1882	4 00	
Frank Paulson		Aug. 18, 1882	18, 1882	4 00	
Henry Miller, 2d		Aug. 18, 1882	18, 1882	4 00	
Peter Piper		Aug. 18, 1882	18, 1882	4 00	

LIST OF INMATES ADMITTED — Continued.

NAME.	Co.	Regiment.	Age.	Service.	Nativity.	Occupation.	Disability.	Admitted.	Pensions.	Remarks.
Lewis Charles.	E	1 United States Art.	23	6 1-12	U. S.	Shoemaker.	Chr. rheumatism and wounds.	Oct. 30, 1892	\$6 00	Discharged O. R. April 26, 1893
John Taylor.	A	37 New York Inf.	30	2	U. S.	Painter.	Partial blindness.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Frederick Hubel.	B	48 New York Inf.	72	3	Germany.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Abram Thomas.	O	122 New York Inf.	70	3	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Hugh Sharkey.	A	133 New York Inf.	49	3	Ireland.	Blacksmith.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
George Gots.	H	2 New York Battery.	36	2	Germany.	Baker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Anthony Paul.	B	140 New York Inf.	59	1	Germany.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
John C. Weber.	K	104 New York Inf.	42	19	Germany.	Cabinet maker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Thomas Dickenson.	K	42 New York Inf.	69	5-12	U. S.	Blacksmith.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Patrick O'Brien.	D	5 New York Art.	71	2	Germany.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
George Blum.	D	25 New York Inf.	50	2	Ireland.	Carpenter.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
James Kelly.	D	12 New York Inf.	62	2	U. S.	Cabinet maker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
William Moran.	II	122 New York Inf.	51	2	Scotland.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Henry Ahern.	A	31 New York Inf.	42	1	Ireland.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Thomas O'Leary.	D	1 Rhode Island Inf.	48	3	Ireland.	Wagon maker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Zenas Grommon.	G	2 N. Inf.	73	1	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Daniel Woodcock.	D	21 N. Inf.	42	1	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Isiah T. Simmons.	I	15 N. Inf.	72	6-12	U. S.	Printer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Edwin H. Smith.	P	15 N. Inf.	56	6-12	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
George Cosier.	E	6 N. Inf.	61	7-12	Canada.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Atkinson Hull.	C	31 N. Inf.	60	2	Ireland.	Morocco dresser.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
John Stewart.	A	18 N. Inf.	36	1	Scotland.	Machineist.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
John B. Curlik.	I	8 New York Inf.	36	1	U. S.	Cigar maker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Augustus Griffin.	K	13 New York Inf.	35	6-12	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Michael J. Wille.	K	38 New York Inf.	36	8-12	U. S.	Carpenter.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Marcus H. Wilcox.	C	125 New York Inf.	36	8-12	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Michael Hollahan.	C	149 New York Inf.	39	2	Ireland.	Machineist.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Simcon Doss.	C	153 New York Inf.	52	3	U. S.	Baker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Alfred G. Bennett.	C	15 New York Cav.	64	2	U. S.	Harness maker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Orlando H. Wilkey.	B	14 New York Art.	35	1	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Stephen Fay.	B	5 California Inf.	47	4	Ireland.	Painter.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Levi H. Putman.	B	3 New York Art.	52	1	U. S.	Carpenter.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
John Doran.	D	3 New York Art.	42	1	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Isaac H. Wickham.	K	124 New York Art.	46	1	U. S.	Printer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Michael Kehle.	I	4 New York Cav.	30	4-12	Germany.	Bookbinder.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Edward Brown.	L	8 New York Cav.	46	3-12	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Charles Mudge.	O	4 New York Inf.	53	4-12	Germany.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Christopher Smith.	L	6 New York Art.	60	1	Germany.	Farmer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Felix Bohott.	A	8 Ind. Inf.	58	3	Germany.	Cigar maker.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
David Leigh.	A	5 United States Art.	54	3	England.	Painter.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
Patrick Daily.	A	6 New York Inf.	62	2	Ireland.	Rheumatism.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893
John Brinkman.	B	60 New York Inf.	60	2	U. S.	Laborer.	Chr. rheumatism.	Oct. 30, 1892		Discharged O. R. April 26, 1893

James (191)	George Jakes	John Connolly	John McFarlin	Samuel Osborn	Thomas E. Dunn	James McGroarty	Mathew Nolan	Eugene Tinsions	Brighani H. Hall	John Reynolds	Patrick McCabe	Thomas Johns	Andrew Dunn	Joseph Weston	William Cook	Charles Steimel	Patrick Downey	Jessie Babcock	John Grogan	Peter Sweeney	Richard McAnally	Patrick McDermott	Peter H. Shinnway	James Bonney	Samuel J. Collins	Samuel J. Clark	Michael Connelly	Arthur Bennett	George Dunn	William H. Richards	Frank Franziga	Augustus Renaux	Stephen Mahoney	John J. Blackett	Charles Moran	James Brown	Robert Montgomery	Joseph Gerhard	Hugh Donnelly	John Baldwin	John Ayan	William James	George Bender	Bartholemew Congruif	Daniel Gass	Isidor Moser	Wyant Bonington	Charles H. Jenkins	Henry S. Strong	Charles Quinn	Waterman B. Rathbun	Harvey P. Haggerty	George M. Egleton	Willard Morrell	William Waldeck	William Sanford																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
73	91	96	100	123	125	5	5	14	16	25	43	7	79	12	14	12	14	3	46	66	133	27	31	37	47	77	16	2	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	101	103	105	107	109	111	113	115	117	119	121	123	125	127	129	131	133	135	137	139	141	143	145	147	149	151	153	155	157	159	161	163	165	167	169	171	173	175	177	179	181	183	185	187	189	191	193	195	197	199	201	203	205	207	209	211	213	215	217	219	221	223	225	227	229	231	233	235	237	239	241	243	245	247	249	251	253	255	257	259	261	263	265	267	269	271	273	275	277	279	281	283	285	287	289	291	293	295	297	299	301	303	305	307	309	311	313	315	317	319	321	323	325	327	329	331	333	335	337	339	341	343	345	347	349	351	353	355	357	359	361	363	365	367	369	371	373	375	377	379	381	383	385	387	389	391	393	395	397	399	401	403	405	407	409	411	413	415	417	419	421	423	425	427	429	431	433	435	437	439	441	443	445	447	449	451	453	455	457	459	461	463	465	467	469	471	473	475	477	479	481	483	485	487	489	491	493	495	497	499	501	503	505	507	509	511	513	515	517	519	521	523	525	527	529	531	533	535	537	539	541	543	545	547	549	551	553	555	557	559	561	563	565	567	569	571	573	575	577	579	581	583	585	587	589	591	593	595	597	599	601	603	605	607	609	611	613	615	617	619	621	623	625	627	629	631	633	635	637	639	641	643	645	647	649	651	653	655	657	659	661	663	665	667	669	671	673	675	677	679	681	683	685	687	689	691	693	695	697	699	701	703	705	707	709	711	713	715	717	719	721	723	725	727	729	731	733	735	737	739	741	743	745	747	749	751	753	755	757	759	761	763	765	767	769	771	773	775	777	779	781	783	785	787	789	791	793	795	797	799	801	803	805	807	809	811	813	815	817	819	821	823	825	827	829	831	833	835	837	839	841	843	845	847	849	851	853	855	857	859	861	863	865	867	869	871	873	875	877	879	881	883	885	887	889	891	893	895	897	899	901	903	905	907	909	911	913	915	917	919	921	923	925	927	929	931	933	935	937	939	941	943	945	947	949	951	953	955	957	959	961	963	965	967	969	971	973	975	977	979	981	983	985	987	989	991	993	995	997	999	1001	1003	1005	1007	1009	1011	1013	1015	1017	1019	1021	1023	1025	1027	1029	1031	1033	1035	1037	1039	1041	1043	1045	1047	1049	1051	1053	1055	1057	1059	1061	1063	1065	1067	1069	1071	1073	1075	1077	1079	1081	1083	1085	1087	1089	1091	1093	1095	1097	1099	1101	1103	1105	1107	1109	1111	1113	1115	1117	1119	1121	1123	1125	1127	1129	1131	1133	1135	1137	1139	1141	1143	1145	1147	1149	1151	1153	1155	1157	1159	1161	1163	1165	1167	1169	1171	1173	1175	1177	1179	1181	1183	1185	1187	1189	1191	1193	1195	1197	1199	1201	1203	1205	1207	1209	1211	1213	1215	1217	1219	1221	1223	1225	1227	1229	1231	1233	1235	1237	1239	1241	1243	1245	1247	1249	1251	1253	1255	1257	1259	1261	1263	1265	1267	1269	1271	1273	1275	1277	1279	1281	1283	1285	1287	1289	1291	1293	1295	1297	1299	1301	1303	1305	1307	1309	1311	1313	1315	1317	1319	1321	1323	1325	1327	1329	1331	1333	1335	1337	1339	1341	1343	1345	1347	1349	1351	1353	1355	1357	1359	1361	1363	1365	1367	1369	1371	1373	1375	1377	1379	1381	1383	1385	1387	1389	1391	1393	1395	1397	1399	1401	1403	1405	1407	1409	1411	1413	1415	1417	1419	1421	1423	1425	1427	1429	1431	1433	1435	1437	1439	1441	1443	1445	1447	1449	1451	1453	1455	1457	1459	1461	1463	1465	1467	1469	1471	1473	1475	1477	1479	1481	1483	1485	1487	1489	1491	1493	1495	1497	1499	1501	1503	1505	1507	1509	1511	1513	1515	1517	1519	1521	1523	1525	1527	1529	1531	1533	1535	1537	1539	1541	1543	1545	1547	1549	1551	1553	1555	1557	1559	1561	1563	1565	1567	1569	1571	1573	1575	1577	1579	1581	1583	1585	1587	1589	1591	1593	1595	1597	1599	1601	1603	1605	1607	1609	1611	1613	1615	1617	1619	1621	1623	1625	1627	1629	1631	1633	1635	1637	1639	1641	1643	1645	1647	1649	1651	1653	1655	1657	1659	1661	1663	1665	1667	1669	1671	1673	1675	1677	1679	1681	1683	1685	1687	1689	1691	1693	1695	1697	1699	1701	1703	1705	1707	1709	1711	1713	1715	1717	1719	1721	1723	1725	1727	1729	1731	1733	1735	1737	1739	1741	1743	1745	1747	1749	1751	1753	1755	1757	1759	1761	1763	1765	1767	1769	1771	1773	1775	1777	1779	1781	1783	1785	1787	1789	1791	1793	1795	1797	1799	1801	1803	1805	1807	1809	1811	1813	1815	1817	1819	1821	1823	1825	1827	1829	1831	1833	1835	1837	1839	1841	1843	1845	1847	1849	1851	1853	1855	1857	1859	1861	1863	1865	1867	1869	1871	1873	1875	1877	1879	1881	1883	1885	1887	1889	1891	1893	1895	1897	1899	1901	1903	1905	1907	1909	1911	1913	1915	1917	1919	1921	1923	1925	1927	1929	1931	1933	1935	1937	1939	1941	1943	1945	1947	1949	1951	1953	1955	1957	1959	1961	1963	1965	1967	1969	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	2023	2025	2027	2029	2031	2033	2035	2037	2039	2041	2043	2045	2047	2049	2051	2053	2055	2057	2059	2061	2063	2065	2067	2069	2071	2073	2075	2077	2079	2081	2083	2085	2087	2089	2091	2093	2095	2097	2099	2101	2103	2105	2107	2109	2111	2113	2115	2117	2119	2121	2123	2125	2127	2129	2131	2133	2135	2137	2139	2141	2143	2145	2147	2149	2151	2153	2155	2157	2159	2161	2163	2165	2167	2169	2171	2173	2175	2177	2179	2181	2183	2185	2187	2189	2191	2193	2195	2197	2199	2201	2203	2205	2207	2209	2211	2213	2215	2217	2219	2221	2223	2225	2227	2229	2231	2233	2235	2237	2239	2241	2243	2245	2247	2249	2251	2253	2255	2257	2259	2261	2263	2265	2267	2269	2271	2273	2275	2277	2279	2281	2283	2285	2287	2289	2291	2293	2295	2297	2299	2301	2303	2305	2307	2309	2311	2313	2315	2317	2319	2321	2323	2325	2327	2329	2331	2333	2335	2337	2339	2341	2343	2345	2347	2349	2351	2353	2355	2357	2359	2361	2363	2365	2367	2369	2371	2373	2375	2377	2379	2381	2383	2385	2387	2389	2391	2393	2395	2397	2399	2401	2403	2405	2407	2409	2411	2413	2415	2417	2419	2421	2423	2425	2427	2429	2431	2433	2435	2437	2439	2441	2443	2445	2447	2449	2451	2453	2455	2457	2459	2461	2463	2465	2467	2469	2471	2473	2475	2477	2479	2481	2483	2485	2487	2489	2491	2493	2495	2497	2499	2501	2503	2505	2507	2509	2511	2513	2515	2517	2519	2521	2523	2525	2527	2529	2531	2533	2535	2537	2539	2541	2543	2545	2547	2549	2551	2553	2555	2557	2559	2561	2563	2565	2567	2569	2571	2573	2575	2577	2579	2581	2583	2585	2587	2589	2591	2593	2595	2597	2599	2601	2603	2605	2607	2609	2611	2613	2615	2617	2619	2621	2623	2625	2627	2629	2631	2633	2635	2637	2639	2641	2643	2645	2647	2649	2651	2653	2655	2657	2659	2661	2663	2665	2667	2669	2671	2673	2675	2677	2679	2681	2683	2685	2687	2689	2691	2693	2695	2697	2699	2701	2703	2705	2707	2709	2711	2713	2715

LIST OF INMATES ADMITTED — Continued.

NAME.	Co.	Regiment.	Age.	Service	Nativity.	Occupation.	Disability.	Admitted.	Pen-sion.	Remarks.
John Doran.....	A	17 New York Inf.....	43	2	Ireland.....	Hatter	Ph'sis pulmonalis	Feb. 13, 1883	.....	Disch'ged O. R. Dec. 21, 1883
John Doherty	G	2 United States Inf.....	66	3	Ireland.....	Laborer	Rheumatism.....	Feb. 26, 1883	.....
Sirrell Brussnan	F	8 Vermont Infantry.....	63	3	U. S.....	Carpenter.....	Dislocation of left arm and sh'lder.	Feb. 26, 1883	\$8 00	Disch'ged O. R. Mar. 14, 1884
William L. McDermott....	D	20 New York Inf.....	62	3	U. S.....	Mill wright.....	Rupture and bronchitis.....	Feb. 26, 1883	.....	Sum. disch'gd, Aug. 12, 1884
Henry Roscoe.....	C	4 New York Inf.....	50	3-12	U. S.....	Machinist	Rupture	Mar. 3, 1883	17 00	Disch'ged O. R. April 23, 1883
Hubert Neuss.....	E	68 New York Inf.....	64	6-12	Germany.....	Soldier	Asthma	Mar. 3, 1883	.....
Henry Miller	C	1 Maryland Cavalry.....	81	2	U. S.....	Blacklayer.....	General debility...	Mar. 3, 1883	.....	Deserted March 21, 1883
Charles D. Cnrtis.....	K	62 New York Inf.....	41	10-12	U. S.....	Clerk	Epilepsy	Mar. 5, 1883	.....
Hiram Moore.....	K	137 New York Inf.....	56	3	U. S.....	Laborer	Gunshot wound...	Mar. 5, 1883	4 00	
Peter Monk.....		United States Navy.....	60	3	Ireland.....	Sailor	Rheumatism.....	Mar. 12, 1883	.....	Sum. disch'ged, Mar. 8, 1884
George H. Young.....	A	31 United States C. T... ..	43	2	U. S.....	Laborer	Dropsy	Mar. 17, 1883	.....	Died April 14, 1883
James Rontledge.....	K	6 New York Inf.....	46	1	Ireland.....	Laborer	Disease of spine...	Mar. 17, 1883	3 00	Disch'ged O. R. July 9, 1883
William Barnard.....	H	1 New York L. A.....	47	3	U. S.....	Printer	Intermittent fever	Mar. 20, 1883	.....	Disch'ged O. R. May 21, 1883
Patrick McGinn.....	G	28 New York Inf.....	58	3-12	Ireland.....	Shoemaker	Gunshot wound...	Mar. 20, 1883	.....	Deserted July 13, 1884
Frederick Zimmerman...	H	146 New York Inf.....	54	2 10-12	Germany.....	Tailor	General debility...	Mar. 20, 1883	.....
Barnard Koller.....	D	105 New York Inf.....	63	3	Germany.....	Laborer	Gunshot wound...	Mar. 20, 1883	.....
Cary D. Stearns.....	H	48 New York Inf.....	49	3	U. S.....	Clerk	Shell wound	Mar. 28, 1883	.....	Disch'ged O. R. Mar. 15, 1884
John Finn.....	K	33 New York Inf.....	65	4	Ireland.....	Laborer	Kidney disease...	Mar. 28, 1883	.....	Sum. disch'gd Sept. 10, 1884
Charles C. Smith	D	34 New York Inf.....	63	1	U. S.....	Machinist.....	Heart disease	Mar. 29, 1883	.....
Laurence Lipe.....	H	29 Wisconsin Inf.....	56	1	U. S.....	Laborer	Erysipelas.....	Mar. 29, 1883	.....
John McDonald.....	C	13 New York Artillery.	50	1 2-12	U. S.....	Sailor	Paralysis	Mar. 29, 1883	.....	Disch'ged O. R. March 6, 1884
William G. Wilson.....	K	8 New York Cavalry...	39	3	U. S.....	Clerk.....	Gunshot wound...	Mar. 31, 1883	8 00	Deserted March 27, 1884
Alfred Nichols.....	E	97 New York Inf.....	67	2	U. S.....	Farmer.....	Hernia	Mar. 31, 1883	.....	Disch'ged O. R. April 27, 1883
Eugene Adelman.....	K	52 New York Inf.....	63	7-12	Germany.....	Painter.....	Chr. rheumatism.	Mar. 31, 1883	.....
Hugh Heeney.....	G	173 New York Inf.....	57	8-12	Ireland.....	Laborer	Malarial fever...	Mar. 31, 1883	.....
Nathan Greek.....	A	89 New York Inf.....	50	2	U. S.....	Farmer.....	Gunshot wound...	April 3, 1883	.....	Disch'ged O. R. June 12, 1884
George M. Muldowney...	D	5 New York Inf.....	52	1 6-12	U. S.....	Plumber	Gunshot wound...	April 3, 1883	5 33	Disch'ged O. R. Dec. 19, 1883
William Fraumpton.....	D	2 New York Artillery...	46	2 9-12	England.....	Laborer	Rheumatism.....	April 3, 1883	.....	Disch'ged O. R. April 23, 1884
Christopher Sheltz	C	5 New York Artillery...	73	1 5-12	U. S.....	Laborer	Wound in left foot	April 17, 1883	.....	Died July 23, 1883
Daniel Bossart.....	A	1 Vermont R. C.....	56	2 8-12	Switzerland	Tailor.....	Defective vision...	April 17, 1883	.....	Disch'ged O. R. May 15, 1883
Edward Miner.....		United States Navy.....	51	4	U. S.....	Seaman	Defective vision...	April 17, 1883	.....	Disch'ged O. R. Nov. 21, 1883
Timothy McMahon.....	D	49 New York Inf.....	63	1	Ireland.....	Laborer	Frozen fingers...	April 17, 1883	.....
George Kerwin.....		United States Navy.....	62	6	Ireland.....	Seaman	Rupture.....	April 17, 1883	.....	Disch'ged O. R. Dec. 14, 1883
Isaac Thompson	E	1 New York M. R.....	57	1 5-12	U. S.....	Laborer	Liver disease.....	April 22, 1883	.....	Died September 21, 1883
Philip Riley.....	A	16 New York Inf.....	62	3 9-12	Ireland.....	Laborer	Gunshot wound...	April 22, 1883	2 00	
George C. Wise.....	L	2 Illinois L. A.....	72	2 4-12	U. S.....	Laborer	Piles.....	April 26, 1883	.....	Sum. disch'gd, Sept. 16, 1884
Charles Herwick.....	B	155 New York Inf.....	56	3	U. S.....	Painter	Shell wound	April 26, 1883	2 00	
Samuel G. Ridgeway....	C	6 New York Artillery...	70	2 8-12	England.....	Weaver	Gunshot wound...	April 26, 1883	4 00	
Patrick Nicholl.....	K	93 New York Inf.....	73	2 7-12	Ireland.....	Gardener	Gunshot wound...	April 26, 1883	6 00	
William Toomey.....	I	50 New York Inf.....	65	4 2-12	Ireland.....	Shoemaker	General debility...	April 26, 1883	.....
John Lamb.....	F	42 New York Inf.....	58	4 2-12	Ireland.....	Laborer	Injury to foot.....	May 1, 1883	.....	Disch'ged O. R. Aug. 1, 1884
Robert Hannev.....	D	3 New York Artillery...	57	1 3-12	Scotland	Laborer	Sore leg	May 1, 1883	.....
William McGill.....	C	6 New York Artillery...	72	3	Ireland.....	Laborer	Bronchitis.....	May 4, 1883	.....	Died September 13, 1883
George Armstrong.....	B	79 New York Inf.....	66	3	England.....	Printer.....	Rupture.....	May 4, 1883	.....
James Close.....	K	159 New York Inf.....	73	2 10-12	England.....	Mason.....	Gun shot wound right hand.....	May 8, 1883	.....

Fridolin Weinmann	B	68 New York Inf.	48	1	Germany	Gardener	Chr. rheumatism	May 14, 1883	.....	Sum. disch'gd, July 17, 1883
John N. Doque	P	5 United States Art.	51	3	France	Clerk	Chronic diarrhoea	May 14, 1883	2 00	Deserted March 19, 1884
Lock Farrell	I	9 New York Artillery	50	7-12	Ireland	Laborer	Chr. inflammation of bladder	May 17, 1883		
Frederick Richards	M	9 New York H. A.	61	3	Germany	Butcher	Injury to left ankle and leg	May 17, 1883		
John Haggarty	A	14 New York H. A.	62	1	Ireland	Laborer	Rheumatism	May 18, 1883		Deserted, March 27, 1884
Conrad Fagle	K	62 Michigan Inf.	67	1	Germany	Wheelwright	Deafness	May 23, 1883		Deserted June 26, 1884
Timothy Hogan	A	175 New York Inf.	70	1	Ireland	Laborer	Varicose veins	May 23, 1883		
Jacob S. Lewis	E	6 New York H. A.	63	7-12	U. S.	Shoemaker	Hypertrophy of heart	May 23, 1883		Died May 18, 1884
Peter Platt Williams	K	197 New York Inf.	55	5-12	U. S.	Civil engineer	Defective vision	May 24, 1883		Died October 13, 1883
William Cunningham	C	5 New York Inf.	62	2	U. S.	Seaman	Kidney disease	May 24, 1883		
Thomas Morgan	I	98 New York Inf.	62	3	England	Tanner	Gun shot wound	May 25, 1883		
Simson Forbush	A	1 New York Artillery	50	4-12	U. S.	Farmer	In right leg	May 25, 1883		Disch'ged O. R. Aug. 23, 1884
John Flynn	K	12 New Hampshire Inf.	59	1	Ireland	Laborer	Rheumatism	May 25, 1883		
Henry George	A	9 New York H. A.	56	1	Germany	Laborer		May 25, 1883	6 00	Deserted July 19, 1883
Bartholomew Sullivan	H	24 New York Cavalry	44	1	Ireland	Laborer		May 25, 1883		Died May 31, 1883
Edward Gross	A	6 New York Cavalry	49	3	Germany	Clerk		May 25, 1883		Died December 10, 1883
William J. Haley	K	2 United States Art.	41	5	U. S.	Musician		May 26, 1883		Disch'ged O. R. Aug. 3, 1883
John Ivin	H	5 New York Inf.	66	1	England	Painter		May 26, 1883		Died May 23, 1884
Thomas Boyd	B	47 New York Inf.	62	4-12	Ireland	Laborer		June 2, 1883		
Florence Crowley	B	9 New York Inf.	65	4	Ireland	Laborer		June 2, 1883		
George Nelson	B	United States Navy	65	5	U. S.	Engineer		June 2, 1883		Sum. disch'ged Mar. 20, 1884
Rudolph H. Orsath	A	3 New York Cavalry	50	3	U. S.	Teamster		June 2, 1883		
Michael Kenaly	D	48 New York Inf.	79	1	Ireland	Baker		June 2, 1883		
William H. Bullis	L	United States Navy	44	2	U. S.	Sailor		June 6, 1883		Deserted August 27, 1883
Edward Fagan	I	4 New York H. A.	42	5	U. S.	Laborer		June 6, 1883		Sum. disch'gd, May 19, 1884
Jason C. Gillette	I	15 Michigan Inf.	69	2	U. S.	Mechanic		June 6, 1883		
William McGrath	G	73 New York Inf.	43	3	Ireland	Pedlar		June 8, 1883		
Michael Smith	P	United States Navy	40	7-12	England	Laborer		June 8, 1883		Died June 6, 1884
Marvin Wilson	I	33 New York Inf.	75	6-12	U. S.	Farmer		June 8, 1883		
John Reese	I	12 New York Inf.	53	2	U. S.	Laborer		June 8, 1883	4 00	Disch'ged O. R. July 10, 1883
John P. Carroll	A	1 N. Y. Ind Battery	46	1	U. S.	Fireman		June 13, 1883		
Charles Schrader	A	1 New York M. R.	70	2	Hanover	Upholsterer		June 13, 1883		
Patrick Nell	L	1 New York Artillery	49	2	Ireland	Laborer		June 13, 1883		Disch'ged O. R. Aug. 21, 1883
Conrad Palke	H	15 New York engineers	42	2	Germany	Shoemaker		June 13, 1883	30 00	
Michael O'Holland	H	United States Navy	53	1	U. S.	Seaman		June 15, 1883	7 00	Disch'ged O. O. 213, Sep. 14, '83
Daniel Tolan	H	United States Navy	42	9	Ireland	Blacksmith		June 15, 1883		Sum. disch'gd Sept. 26, 1883
Henry Raff	B	7 New York Inf.	59	5	Germany	Tailor		June 15, 1883	4 00	
Caspar Memmel	D	29 New York Inf.	60	1	Germany	Cabinet maker		June 15, 1883		
Ferdinand Hunnells	K	131 New York Inf.	64	1	U. S.	Clerk		June 19, 1883	6 00	Sum. disch'gd, Sept. 12, 1883
James W. Ross	K	United States Navy	44	1	Nova Scotia	Clerk		June 19, 1883		
John Tompkins	G	146 New York Inf.	74	3	U. S.	Laborer		June 20, 1883		
Daniel Sullivan	G	69 New York Inf.	56	1	Ireland	Laborer		June 20, 1883		
Thomas S. Banfield	G	15 New York Inf.	53	4	England	Bookbinder		June 20, 1883	2 00	Sum. disch'gd, Mar. 8, 1880
Andrew Briethul	C	14 New York Inf.	60	3	Germany	Blacksmith		June 20, 1883		Disch'ged O. R. April 14, 1884
John Fitzgerald	A	19 New York Battery	83	1	Ireland	Laborer		June 20, 1883		Deserted August 15, 1883

LIST OF INMATES ADMITTED—Continued.

NAME	Co.	Regiment.	Age.	Service.	Nativity.	Occupation.	Disability.	Admitted.	Reb- stated.	Remarks.
Thomas Hennessy	E	7 New York Inf.	36	1 8-12	Germany	Painter	Rheumatism	June 22, 1893		Disch'd O. R. Feb. 14, 1894
Michael Kelly	E	31 New York Inf.	43	4	Germany	Carpenter	Lung disease	June 29, 1893		Died June 30, 1893
Mathias Kecher	E	84 New York Inf.	51	4	Ireland	Tinsmith	General debility	July 2, 1893		Disch'd O. R. April 28, '94
George Schorer	I	141 New York Inf.	61	9-12	Ireland	Laborer	Blindness	July 2, 1893		
George Stapleton	I	1 New York Inf.	40	8	U. S.	Painter	G. S. w. right leg	July 2, 1893		
Ernest N. Harriensburgh	A	179 New York Inf.	49	8-12	Canada	Painter	General debility	July 2, 1893		Deserted December 18, 1893
George Bohannan	G	169 New York Inf.	60	3 10-12	Germany	Farmer	Deafness, biliousness & neuralgia	July 2, 1893	32 60	
Thomas Hennessy	E	2 New York Inf.	50	1 10-12	Ireland	Laborer	Gunshot wound, right thigh	July 2, 1893	8 00	Sum. disch'd, Oct. 14, 1893
Michael Kelly	E	82 New York Inf.	39	8-12	Ireland	Cook	Malaria poisoning	July 2, 1893	2 00	Sum. disch'd, Oct. 22, 1893
Mathias Kecher	F	99 New York Inf.	43	1 3-12	Germany	Farmer	Gunshot wound, paralytic	July 2, 1893	4 00	O. R. disch'd, Oct. 10, 1893
George Schorer	H	55 New York Inf.	49	4	Germany	Printer	Gunshot wound, paralytic	July 2, 1893	6 00	
George Stapleton	I	137 New York Inf.	55	2 5-12	England	Clerk	Gunshot wound, paralytic	July 2, 1893	4 00	
Ernest N. Harriensburgh	I	56 New York Inf.	75	4 4-12	U. S.	Farmer	Ulcerated legs	July 2, 1893	4 00	Died September 7, 1894
George Bohannan	G	13 New York Inf.	46	3 6-12	Ireland	Cooper	General debility	July 2, 1893		
Thomas Donahue	D	100 New York Inf.	72	7-12	Ireland	Laborer	Gunshot wound, right shoulder	July 2, 1893		
Richard Allen	H	100 New York Inf.	53	3 5-12	England	Rope maker	Gunshot wound, left hand	July 4, 1893		Disch'd O. R. April 2, 1894
Robert Teter	L	24 New York Cav.	62	10-12	U. S.	Farmer	Rheumatism	July 19, 1893		
James Mahoney	A	91 New York Inf.	53	4	Ireland	Painter	Rheumatism	July 19, 1893		
Wm H. Smith	A	175 New York Inf.	54	2-12	Ireland	Laborer	Rheumatism	July 19, 1893		
David Haynes	B	140 New York Inf.	46	2 11-12	U. S.	Honkman	G. S. w. right leg	July 19, 1893	4 00	Disch'd O. R. June 23, 1894
James Cunningham	C	79 New York Inf.	60	3-12	Scotland	Painter	Varicose veins	July 19, 1893		Disch'd O. R. Aug. 22, 1894
Walter McD. Murray	G	161 New York Inf.	63	1	Scotland	Butcher	Varicose veins	July 19, 1893		Disch'd O. R. Aug. 26, 1894
John Gleason	H	34 New York Inf.	73	2	Ireland	Farmer	Gunshot wound	July 19, 1893		
William Keough	D	United States Navy	45	2 3-12	England	Fireman		July 19, 1893		
Michael Christman	E	5 New York Art.	61	3 2-12	Germany	Laborer		July 19, 1893		
John H. Smith	E	14 New York Inf.	60	1 4-12	U. S.	Watchmaker		July 19, 1893		Disch'd O. R. Nov. 4, 1894
Henry Kelly	A	51 S. Artillery	44	22 6-12	Ireland	Soldier		July 19, 1893		Disch'd O. R. May 27, 1894
John Thompson	D	5 New York Art.	60	2 5-12	Ireland	Miller		July 19, 1893		
John Park	A	36 New York Inf.	60	3 2-12	Scotland	Stone cutter		July 19, 1893		Disch'd O. R. Aug. 14, 1893
Thomas McDonald	C	United States Navy	65	1	Ireland	Laborer		July 19, 1893		Died, August 8, 1893
Kilian Weber	D	31 New York Inf.	66	3 10-12	Germany	Tailor		July 20, 1893		Disch'd O. R. Sept. 1, 1893
Patrick Gilson	D	130 New York Inf.	62	3 9-12	Ireland	Farmer		July 20, 1893	4 00	Deserted April 9, 1894
John Lee	D	47 New York Inf.	36	17 8-12	U. S.	Carpenter		July 20, 1893		Died Sept. 10, 1893
David Deau	U	163 New York Inf.	25	3	Germany	Laborer		July 20, 1893		Disch'd sum. Sept. 14, 1894
Henry Beckwith	U	3 New York Cav.	47	3 2-12	Ireland	Laborer		July 20, 1893		Died, October 11, 1893
Thomas Zimmerman	Y	5 New York Cav.	43	1 3-12	Germany	Confessionner		July 24, 1893		Disch'd O. R. Aug. 26, 1893
Thomas Humphries	D	5 Ohio Inf.	61	4 3-12	Wales	Weaver	Gunshot wound, right shoulder & hand	July 24, 1893	4 00	Deserted, April 21, 1894
George F. White	E	152 New York Inf.	64	1 6-12	U. S.	Painter	Injury to left foot	July 24, 1893	30 00	Disch'd O. R. Sep. 14, '94
Thomas Hart	C	21 New York Cavalry	60	1 3-12	Ireland	Laborer		July 25, 1893		
Charles Cook	U	10 U. S. Inf.	67	6	Ireland	Laborer	Loss of sight of left eye	July 26, 1893		

James Mount,	19 N. Y. Battery	67	2	9-12	Ireland	Laborer	Paralytic	July 25, 1883	8 00	Sum disch'gd, March 14, 1884
Edney Burr, Jr.	173 New York Inf.	45	2	6-12	U. S.	Shoemaker	Scurvy, both legs.	July 30, 1883		O. R. disch'gd Aug. 16, 1883
John H. Deput	20 New York Inf.	35	3	9-12	U. S.	Laborer	Rheumatism	Aug. 2, 1883		Died August 10, 1883
Van Tassel Conklin	173 New York Inf.	55	3	9-12	U. S.	Butcher	Gunsight wound	Aug. 2, 1883		
Albert E. Lathrop	3 United States Art.	49	7	9-12	U. S.	Carpenter		Aug. 2, 1883		Disch'gd O. R. Sept. 9, 1884
William Henry Davis	1 New York M. B.	74	2	9-12	U. S.	Mason		Aug. 2, 1883		Disch'gd O. R. April 1, 1884
Patrick Martin	10 New York Inf.	64	19	7-12	Ireland	Soldier		Aug. 11, 1883		Disch'gd O. R. May 12, 1884
James Clancy	6 New York Inf.	60	1	7-12	Ireland	Laborer		Aug. 11, 1883		
John McGowan	United States Navy	44		9-12	Ireland	Baker		Aug. 11, 1883		Died August 18, 1883
Patrick Mahony	140 New York Inf.	43	3	9-12	U. S.	Taylor	Malaria fever	Aug. 11, 1883		Sum disch'gd, June 23, 1884
Lawrence Cooney	43 New York Inf.	66	3	9-12	U. S.	Boatman	Heart disease	Aug. 11, 1883		Sum disch'gd, Feb. 27, 1884
John Keifer	145 New York Inf.	59	2	9-12	U. S.	Boatman	Loss of both feet,			
Patrick Shelds	12 New York Inf.	42	2	6-12	Ireland	Sailor	frozen.	Aug. 11, 1883		Died March 7, 1884
Joseph P. Faulkner		41	3	6-12	U. S.	Printer		Aug. 11, 1883	4 10	
Francis Silver		47	3	6-12	U. S.	Laborer		Aug. 11, 1883	6 00	Deserted June 28, 1884
James S. Dunn		49	3	6-12	Ireland	Brushmaker		Aug. 15, 1883		Deserted May 7, 1884
John McCormick		63	1	6-12	Ireland	Laborer		Aug. 15, 1883		
Joseph Frankin		63	2	6-12	U. S.	Boatman		Aug. 24, 1883	4 00	Disch'gd O. R. Aug. 21, 1884
Thomas Brennan		56	3	6-12	Ireland	Laborer		Sept. 3, 1883		Disch'gd O. R. Oct. 16, 1883
John Connery	3 New York Art.	51	1	6-12	Ireland	Laborer		Sept. 3, 1883		Deserted September 22, 1884
John Curran	17 New York Inf.	57	2	6-12	Ireland	Laborer		Sept. 3, 1883		Deserted April 9, 1884
William Croft		59	2	6-12	Ireland	Stone mason		Sept. 3, 1883		
Michael Fox		69	2	6-12	Ireland	Laborer		Sept. 3, 1883		Disch'gd O. R. Oct. 15, 1883
Andrew Gallagher		38	1	6-12	Scotland	Laborer		Sept. 3, 1883		
William J. Lee		64	1	6-12	U. S.	Farmer		Sept. 3, 1883		Disch'gd O. R. Nov. 24, 1883
James McIntyre		70	2	6-12	Ireland	Laborer		Sept. 3, 1883		
John H. Rensen		47	2	6-12	U. S.	Shoemaker		Sept. 3, 1883		
George Schuchardt		68	2	6-12	Holland	Tailor		Sept. 3, 1883		
Robert O. Tryon		44	1	6-12	England	Clerk		Sept. 3, 1883	5 33 1/2	Disch'gd O. R. Dec. 17, 1883
Andrew Weize		60	2	6-12	Germany	Tailor		Sept. 3, 1883		
Edward Bloomston		46	3	6-12	Germany	Laborer		Sept. 3, 1883		Disch'gd O. R. Mar. 13, 1884
Albert H. Dayan		61	4	6-12	Germany	Ship carpenter		Sept. 3, 1883		
Lausing N. Deftreast		36	4	6-12	U. S.	Cook		Sept. 3, 1883		Sum disch'gd, Sept. 25, 1883
John Hennessey		37	2	6-12	U. S.	Mechanic		Sept. 3, 1883		
George P. Harrison		31	2	6-12	Ireland	Gardener		Sept. 3, 1883		
James Larkin		46	1	6-12	U. S.	Clerk		Sept. 3, 1883		
William C. Moore		37	1	6-12	U. S.	Marble cutter		Sept. 3, 1883		Disch'gd O. R. Sept. 14, 1884
Jeremiah J. Sullivan		50	3	6-12	U. S.	Tobacco dealer		Sept. 3, 1883	4 00	Disch'gd O. R. March 18, 1884
Robert Anderson		59	2	6-12	U. S.	Tailor		Sept. 3, 1883		Disch'gd O. R. March 24, 1884
John E. Beaton		64	3	6-12	U. S.	Farmer		Sept. 3, 1883		Died September 16, 1884
Michael N. Buckley		45	1	6-12	U. S.	Tailor		Sept. 3, 1883		Died February 28, 1884
John Carroll		56	2	6-12	Ireland	Teemster		Sept. 3, 1883		
James Foster		55	4	6-12	Ireland	Laborer		Sept. 3, 1883		Sum disch'gd, Nov. 23, 1883
William Murphy		68	3	6-12	Ireland	Seaman		Sept. 3, 1883	12 00	Sum disch'gd, Nov. 23, 1883
Oscar Overton		46	4	6-12	U. S.	Boatman		Sept. 3, 1883	6 00	O. R. disch'gd Sept. 16, 1884
William Spencer		48	3	6-12	U. S.	Farmer		Sept. 3, 1883		
James Wright		83	1	6-12	Scotland	Sailor		Sept. 3, 1883		
Thomas Wallace		73	3	6-12	U. S.	Paper maker		Sept. 3, 1883		
William H. Brown		67	3	6-12	U. S.	Gardener		Sept. 3, 1883		Died, June 9, 1884

LIST OF INMATES ADMITTED — Continued.

NAMES.	Co.	Regiment.	Age.	Service.	Nativity.	Occupation.	Admitted.	Pen- sion.	Remarks.
Hamilton Duggan.	B	12 New York Inf.	70	3	Ireland.	Gardener.	Sept. 23, 1893		Disch'ged O. R. Mar. 23, 1894
Theodore Schultz.	A	7 New York Inf.	46	3	Germany.	Furrier.	Sept. 22, 1893		Sum. disch'ged March 13, 1894
Andrew Wilt.	D	104 New York Inf.	56	10-12	Germany.	Tailor.	Sept. 22, 1893		
Thomas Woods.	I	6 New York Inf.	49	3	U. S.	Blacksmith.	Sept. 22, 1893		
Joseph Butler.	H	14 Connecticut Inf.	52	1	England.	Butler.	Oct. 2, 1893		
Charles Junior.	C	103 New York Inf.	63	3	Germany.	Baker.	Oct. 2, 1893		
Patrick Moloney.	A	7 New York M. R.	73	3-13	Ireland.	Laborer.	Oct. 2, 1893	\$8 00	Disch'ged O. R. May 19, 1894
Thomas Mitchell.	C	6 New York Inf.	57	4	Scotland.	Moulder.	Oct. 2, 1893		
Henry Niles.	K	100 New York Inf.	58	3	U. S.	Boatman.	Oct. 2, 1893		
Almon B. Owens.	C	56 New York Inf.	44	3	U. S.	Farmer.	Oct. 2, 1893		
	B	20 United States Inf.	46	3	Ireland.	Laborer.	Oct. 2, 1893	2 00	Died May 6, 1894
	O	6 New York Cavalry.	41	1	U. S.	Farmer.	Oct. 2, 1893		
	H	24 New York Inf.	40	3-12	Germany.	Shoemaker.	Oct. 2, 1893		Disch'ged O. R. April 14, 1894
	H	United States Navy.	56	1	England.	Machinist.	Oct. 9, 1893		
	I	3 New York Inf.	73	3	U. S.	Farmer.	Oct. 9, 1893		
Hugh Osborn.	I	67 New York Inf.	54	3	Ireland.	Laborer.	Oct. 9, 1893		Sum. disch'ged April 17, 1894
	B	43 New York Inf.	69	3	Ireland.	Weaver.	Oct. 9, 1893		
	H	60 New York Inf.	50	3	Canada.	Brakeman.	Oct. 11, 1893		
Alfred Lepaga.	B	67 New York Inf.	67	3	U. S.	Carpenter.	Oct. 11, 1893		
John T. Butler.	E	10 Connecticut Inf.	44	3	Ireland.	Laborer.	Oct. 11, 1893		
William Delaney.	D	56 New York Inf.	44	4	U. S.	Laborer.	Oct. 11, 1893		
James H. Horton.	A	37 New York Inf.	56	2	Ireland.	Laborer.	Oct. 11, 1893		Disch'ged O. R. Mar. 21, 1894
William Martin.	A	47 New York Inf.	43	3	Ireland.	Printer.	Oct. 11, 1893	2 00	
	E	87 New York Inf.	65	3	Ireland.	Laborer.	Oct. 11, 1893		
	G	46 New York Inf.	48	3	U. S.	Steam fitter.	Oct. 16, 1893		Disch'ged O. R. May 12, 1894
	G	175 New York Inf.	67	3	Ireland.	Laborer.	Oct. 16, 1893	\$4 00	
	G	100 New York Inf.	37	3	U. S.	Painter.	Oct. 16, 1893		Sum. disch'ged Mar. 8, 1894
	D	22 Iowa Inf.	63	3	Ireland.	Farmer.	Oct. 16, 1893		
	F	164 New York Inf.	39	3	U. S.	Laborer.	Oct. 16, 1893		Disch'ged October 16, 1893
	F	United States Navy.	55	7	U. S.	Seaman.	Oct. 16, 1893	24 00	Disch'ged O. R. Mar. 10, 1894
	F	18 New York Ind. Bat.	66	3	England.	Calico printer.	Oct. 16, 1893		
	L	United States Navy.	55	3	Canada.	Painter.	Oct. 16, 1893		
	L	8 New York Art.	64	3	Ireland.	Laborer.	Oct. 16, 1893		Died March 3, 1894
	L	6 New York Inf.	48	2	U. S.	Wachinist.	Oct. 16, 1893		Sum. disch'ged Mar. 23, 1894
	H	64 New York Inf.	50	3	Ireland.	Shoemaker.	Oct. 19, 1893		
	H	17 New York Inf.	46	3	U. S.	Harbors maker.	Oct. 19, 1893		
	H	26 U. S. C. T.	70	7-12	U. S.	Laborer.	Oct. 19, 1893		Died May 26, 1894
William Prime.	H	140 New York Inf.	54	3	Germany.	Laborer.	Oct. 19, 1893		
Leonard Krog.	B	68 New York Inf.	47	3	U. S.	Moulder.	Oct. 19, 1893	2 00	
Robert Smith.	E	68 New York Inf.	66	3-12	Austria.	Laborer.	Oct. 19, 1893	4 00	
William Unterwieser.	E								

John Applegate.	A	13 New York Inf.	36	2	10-12	Ireland.	Mason.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Mathew Fox	U	145 New York Inf.	46	2	10-12	Ireland.	Farmer.	Kidney disease.	Oct.	26, 1863	4 00	Died May 6, 1864
Jacob Hoffman.	U	39 New York Inf.	64	2	10-12	Germany.	Baker.	Bronchitis.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Edward Morae.	B	107 New York Inf.	41	3	2-12	U. S.	Laborer.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
John Thompson.	D	1 New York Inf.	73	3	2-12	Ireland.	Moulder.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Thomas J. Shields.	D	3 New York Inf.	40	3	2-12	U. S.	Laborer.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Nicholas Myra.	C	2 New York Inf.	60	3	2-12	Ireland.	Moulder.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
James O'Malley.	L	129 New York Inf.	41	3	2-12	U. S.	File cutter.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Nicholas Dotsell.	D	9 New York Cavalry.	39	3	2-12	Germany.	Shoemaker.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
James Greely.	I	111 New York Inf.	37	3	2-12	U. S.	Moulder.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Julius Barker.	H	100 New York Inf.	30	3	2-12	England.	Rope maker.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
Jacob Haub.	H	30 New York Inf.	43	4	2-12	Germany.	Shoemaker.	Gunshot wound.	Oct.	26, 1863	4 00	Disch'ged O. R. April 21, 1864
John Kennedy.	F	24 New York Inf.	20	1	6-12	Ireland.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Hugh J. Patterson.	U	30 New York Inf.	67	3	6-12	Ireland.	Carpenter.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Noah H. Schultz.	K	146 New York Inf.	46	2	6-12	U. S.	Farmer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Ignatius Spring.	K	29 New York Inf.	55	2	6-12	Germany.	Cigar maker.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
John Tiney.	B	121 New York Inf.	63	3	6-12	Ireland.	Blacksmith.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
George Coffin.	H	27 New York Inf.	39	2	6-12	U. S.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
John I. Cantwell.	B	37 New York Inf.	43	3	6-12	Ireland.	Printer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Michael Donegan.	B	17 New York Inf.	46	3	6-12	U. S.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
George McIlvor.	F	21 New York Inf.	53	2	6-12	Ireland.	Glass blower.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Oliver Stanley.	D	37 New York Inf.	61	3	6-12	Canada.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Jacob Barleaux.	D	107 New York Inf.	63	3	6-12	Ireland.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Samuel Cleary.	K	15 New York Inf.	62	4	6-12	Ireland.	Mason.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Louis DeBerry.	K	22 New York Inf.	66	4	6-12	France.	Tailor.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Conrad Georgens.	D	16 United States Inf.	57	3	6-12	Germany.	Carpenter.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Frank Harris.	O	1 United States Inf.	55	3	6-12	Germany.	Tailor.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
William Keandaly.	I	69 United States Inf.	52	3	6-12	Ireland.	Iron worker.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Stephen B. Starring.	F	1 United States Cav.	61	4	6-12	U. S.	Farmer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Abram Miller.	E	1 United States Cav.	61	4	6-12	U. S.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Henry Casler.	H	1 United States Cav.	61	4	6-12	U. S.	Seaman.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Thomas Doyle.	K	1 United States Cav.	61	4	6-12	U. S.	Farmer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Fredrick Baise.	F	1 United States Cav.	61	4	6-12	U. S.	Farmer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
James Lavelle.	C	1 United States Cav.	61	4	6-12	U. S.	Laborer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
Michael Hartwell.	C	1 United States Cav.	61	4	6-12	U. S.	Farmer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
William Earle.	C	1 United States Cav.	61	4	6-12	U. S.	Farmer.	Gunshot wound.	Nov.	7, 1863	4 00	Disch'ged O. R. April 21, 1864
William H. Dann.	K	1 New York Inf.	37	3	6-12	U. S.	Artist.	Gunshot wound.	Dec.	12, 1863	4 00	Disch'ged O. R. April 21, 1864
Joel Crane.	D	137 New York Inf.	66	3	6-12	U. S.	Shoemaker.	Gunshot wound.	Dec.	12, 1863	4 00	Disch'ged O. R. April 21, 1864
Albert V. Hungerford.	K	53 New York Inf.	71	3	6-12	U. S.	Farmer.	Gunshot wound.	Dec.	12, 1863	4 00	Disch'ged O. R. April 21, 1864
Oliver Murphy.	K	19 New York Inf.	73	1	6-12	U. S.	Laborer.	Gunshot wound.	Dec.	12, 1863	4 00	Disch'ged O. R. April 21, 1864
Charles S. Brown.	F	3 New York Art.	30	3	6-12	U. S.	Saddler.	Gunshot wound.	Dec.	12, 1863	4 00	Disch'ged O. R. April 21, 1864
Bernard Carney.	B	64 New York Inf.	60	3	6-12	Ireland.	Mason.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
Patrick Galligan.	A	24 New York Inf.	46	2	7-12	U. S.	Hostler.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
Anton Florack.	P	58 New York Inf.	66	4	7-12	Germany.	Machinist.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
John McCarthy.	K	23 New York Inf.	36	4	7-12	Ireland.	Laborer.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
James Beck.	B	3 New York Art.	10	4	7-12	Scotland.	Laborer.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
Jacob Fraser.	I	43 New York Inf.	71	3	6-12	U. S.	Farmer.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
Adam Humm.	E	1 New York Cavalry.	53	3	6-12	Germany.	Carrier.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
John Murray.	K	103 New York Inf.	37	3	6-12	U. S.	Painter.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864
Edward P. McCarthy.	G	79 New York Inf.	30	3	6-12	U. S.	Marble cutter.	Gunshot wound.	Jan.	4, 1864	4 00	Disch'ged O. R. April 21, 1864

LIST OF INMATES ADMITTED—Continued.

Edward Dreyfus.	I	42	7-12	France	Confectioner.	April 3, 1884	Disch'ged O. R. April 10, 1884
J. D. W. Fisher	D	60	5	U. S.	Farmer	April 3, 1884	
Daniel Hourigan	P	62	4	Ireland	Laborer	April 3, 1884	
John Hassell	A	48	1	Canada	Laborer	April 3, 1884	
Jacob Kiehl	D	55	3	Germany	Baker	April 3, 1884	Died April 28, 1884
James O'Donnell	D	40	3-12	U. S.	Mouler	April 3, 1884	Disch'ged O. R. April 8, '84
Isaac Windus	E	60	1	England	Gardener	April 3, 1884	
Richard Williams	I	62	4-12	U. S.	Farmer	April 3, 1884	Died June 8, 1884
Jacob Collins	I	59	3	U. S.	Timothy	April 18, 1884	
Ludwig Fredrick	G	56	3	Germany	Printer	April 18, 1884	Died May 20, 1884
John Foley	B	39	1	Ireland	Carpenter	April 18, 1884	
John Farrell	M	66	2	Ireland	Laborer	April 18, 1884	
Thomas Gleason	K	50	3	Ireland	Laborer	April 18, 1884	
Thomas Graham	M	54	2	Ireland	Blacksmith	April 18, 1884	
Augustus T. Hulme	M	53	1	U. S.	Shoemaker	April 18, 1884	
Richard Hanks	Y	67	1	England	Laborer	April 18, 1884	
James Hennessey	G	64	3	Ireland	Shoemaker	April 18, 1884	
Thomas A. Judson	B	54	4	U. S.	Jeweler	April 18, 1884	Disch'ged O. R. June 11, '84
Mason Lee	M	61	2	U. S.	Laborer	April 18, 1884	Disch'ged sum. Aug. 8, 1884
Joseph Malcomson	C	64	2	Ireland	Laborer	April 18, 1884	Disch'ged sum. Sept. 13, 1884
James Phenev	O	39	7	U. S.	Farmer	April 18, 1884	Disch'ged O. R. July 25, 1884
Monckton Somers	O	42	3	U. S.	Machineist	April 18, 1884	
William Sherman	G	50	3	U. S.	Sailor	April 18, 1884	
Henry Dill	G	53	3	U. S.	Moulder	April 18, 1884	
Patrick Ferry	A	69	3	Ireland	Farmer	May 10, 1884	Disch'ged O. R. June 16, 1884
Patrick Griffin	F	45	3	Ireland	Mason	May 10, 1884	Sum disch'ged, July 24, 1884
Thomas Harvey	E	52	4	Ireland	Butcher	May 10, 1884	
Thomas Kewes	E	56	2	Canada	Seaman	May 10, 1884	Sum. disch'ged, Sept. 13, 1884
Edward Mooney	E	61	5	U. S.	Seaman	May 10, 1884	
John Mahan	B	50	3	Ireland	Laborer	May 10, 1884	
Peter Murlon	A	66	3	Ireland	Laborer	May 10, 1884	
Francis Myett	D	66	4	Canada	Laborer	May 10, 1884	
Peter McQuie	C	67	3	Ireland	Cabinet maker	May 10, 1884	
Frederick T. Vane	Adl.	46	2	U. S.	Artist	May 10, 1884	
Bernard Carroll	C	44	3	Ireland	Laborer	May 10, 1884	
James Kerrigan	P	38	3	U. S.	Paper hanger	May 10, 1884	Disch'ged O. R. June 3, 1884
Richard Monroe	H	61	1	U. S.	Laborer	May 10, 1884	Disch'ged O. R. Sept. 16, 1884
James Callahan	E	54	7	U. S.	Moulder	May 27, 1884	Disch'ged sum. June 28, 1884
Jacob Dietz	D	54	3	Germany	Laborer	May 27, 1884	
Martin Schinbofer	A	64	4	U. S.	Laborer	May 27, 1884	Sum. disch'ged, July 3, 1884
Morris Pritchard	E	58	2	U. S.	Tailor	May 27, 1884	
Patrick Tracy	K	60	3	Ireland	Laborer	May 27, 1884	
Thomas O'Hare	C	60	3	Ireland	Laborer	May 27, 1884	Died May 27, 1884
Thomas Dalley	F	40	2	Ireland	Boatman	May 27, 1884	
Wm. H. Flood	B	41	1	Ireland	Painter	June 11, 1884	
Ernest Cagle	I	50	2	Prussia	Laborer	June 11, 1884	
Henry H. Linnell	P	46	2	U. S.	Jeweller	June 11, 1884	
James O'Neil	B	48	3	Ireland	Salesman	June 11, 1884	
John Rhey	C	51	1	U. S.	Farmer	June 11, 1884	
Alex. S. Williamson	E	50	3	U. S.	Farmer	June 11, 1884	
Christian Adrian	H	67	2	Germany	Farmer	June 20, 1884	Disch'ged O. R. Sept. 16, 1884
Chas. C. F. Forerup	E	64	1	Denmark	Clerk	June 20, 1884	
John Funggan	H	62	1	Ireland	Laborer	June 20, 1884	
Benjamin Hollister	K	59	3	U. S.	Farmer	June 20, 1884	

LIST OF INMATES ADMITTED—Continued.

NAME.	Co.	Service	Nativity	Occupation.	Admitted.	Pen- dence.	Remarks.
Dexter V. B. Jolly	P	43	U. S.	Painter.	June 20, 1904		Discharged O. R. Aug. 14, 1904
John Maguire	B	34	Ireland	Monk	June 20, 1904	\$4 00	
James McSherry	U	31	Ireland	Labourer	June 20, 1904		
James McSherry	E	41	Ireland	Labourer	June 20, 1904		
Patrick O'Brien	E	42	Ireland	Blacksmith	June 20, 1904		
Daniel Shay	A	77	Ireland	Labourer	June 20, 1904		
Hamilton O'Brien	U	35	Ireland	Blacksmith	July 1, 1904		
James O'Brien	U	36	Ireland	Blacksmith	July 1, 1904		
Ernest Pflieger	E	47	Germany	Labourer	July 1, 1904	\$6 00	
Wm. H. Harrison	E	48	Germany	Labourer	July 1, 1904		
William Harrison	E	49	Germany	Labourer	July 1, 1904		
Michael Hartman	E	50	Germany	Labourer	July 1, 1904		
Patrick J. J. J.	E	51	Germany	Labourer	July 1, 1904		
John Kennedy	E	52	Germany	Labourer	July 1, 1904		
Michael Mulloney	E	53	Germany	Labourer	July 1, 1904		
George W. Russell	E	54	Germany	Labourer	July 1, 1904		
David Thompson	E	55	Germany	Labourer	July 1, 1904		
Levi P. Thomas	E	56	Germany	Labourer	July 1, 1904		
John Anderson	E	57	Germany	Labourer	July 1, 1904		
John Brown	E	58	Germany	Labourer	July 1, 1904		
John Brown	E	59	Germany	Labourer	July 1, 1904		
John Brown	E	60	Germany	Labourer	July 1, 1904		
John Brown	E	61	Germany	Labourer	July 1, 1904		
John Brown	E	62	Germany	Labourer	July 1, 1904		
John Brown	E	63	Germany	Labourer	July 1, 1904		
John Brown	E	64	Germany	Labourer	July 1, 1904		
John Brown	E	65	Germany	Labourer	July 1, 1904		
John Brown	E	66	Germany	Labourer	July 1, 1904		
John Brown	E	67	Germany	Labourer	July 1, 1904		
John Brown	E	68	Germany	Labourer	July 1, 1904		
John Brown	E	69	Germany	Labourer	July 1, 1904		
John Brown	E	70	Germany	Labourer	July 1, 1904		
John Brown	E	71	Germany	Labourer	July 1, 1904		
John Brown	E	72	Germany	Labourer	July 1, 1904		
John Brown	E	73	Germany	Labourer	July 1, 1904		
John Brown	E	74	Germany	Labourer	July 1, 1904		
John Brown	E	75	Germany	Labourer	July 1, 1904		
John Brown	E	76	Germany	Labourer	July 1, 1904		
John Brown	E	77	Germany	Labourer	July 1, 1904		
John Brown	E	78	Germany	Labourer	July 1, 1904		
John Brown	E	79	Germany	Labourer	July 1, 1904		
John Brown	E	80	Germany	Labourer	July 1, 1904		
John Brown	E	81	Germany	Labourer	July 1, 1904		
John Brown	E	82	Germany	Labourer	July 1, 1904		
John Brown	E	83	Germany	Labourer	July 1, 1904		
John Brown	E	84	Germany	Labourer	July 1, 1904		
John Brown	E	85	Germany	Labourer	July 1, 1904		
John Brown	E	86	Germany	Labourer	July 1, 1904		
John Brown	E	87	Germany	Labourer	July 1, 1904		
John Brown	E	88	Germany	Labourer	July 1, 1904		
John Brown	E	89	Germany	Labourer	July 1, 1904		
John Brown	E	90	Germany	Labourer	July 1, 1904		
John Brown	E	91	Germany	Labourer	July 1, 1904		
John Brown	E	92	Germany	Labourer	July 1, 1904		
John Brown	E	93	Germany	Labourer	July 1, 1904		
John Brown	E	94	Germany	Labourer	July 1, 1904		
John Brown	E	95	Germany	Labourer	July 1, 1904		
John Brown	E	96	Germany	Labourer	July 1, 1904		
John Brown	E	97	Germany	Labourer	July 1, 1904		
John Brown	E	98	Germany	Labourer	July 1, 1904		
John Brown	E	99	Germany	Labourer	July 1, 1904		
John Brown	E	100	Germany	Labourer	July 1, 1904		

Jeremiah Brennan.	C	United States Navy.	35	3	Ireland.	Sailor.	Aug. 8, 1884	Discharged O. B. Aug. 11, '82
Ralph Cassidy.	A	1 Vermont R. C.	75	1	Ireland.	Tailor.	Aug. 8, 1884	
John Cronin.	D	3 New York Inf.	62	3	Ireland.	Laborer.	Aug. 8, 1884	
John Gerrity.	K	66 New York Inf.	38	3	Ireland.	Laborer.	Aug. 8, 1884	
James Gordon.	K	57 New York Inf.	45	3	U. S.	Laborer.	Aug. 8, 1884	
Archibald Graham.	C	60 New York Inf.	51	1	U. S.	Laborer.	Aug. 8, 1884	
James M. Henry.	E	14 United States Inf.	57	3	Scotland.	Carriage maker.	Aug. 8, 1884	
John Hines.	D	United States Navy.	58	1	Ireland.	Gas fitter.	Aug. 8, 1884	
Peter Kennon.	D	United States Navy.	68	3	Ireland.	Laborer.	Aug. 8, 1884	
John Lee.	D	37 New York Inf.	44	2	U. S.	Porter.	Aug. 8, 1884	
Walter Mead.	C	136 New York Inf.	65	1	U. S.	Carpenter.	Aug. 9, 1884	
Timothy O'Grady.	E	43 New York Inf.	62	3	Ireland.	Shoemaker.	Aug. 8, 1884	
Christopher Riebel.	O	97 New York Inf.	73	1	Germany.	Tailor.	Aug. 8, 1884	
Otto Steel.	C	69 New York Inf.	52	3	Germany.	Butcher.	Aug. 8, 1884	
John Slatery.	D	173 New York Inf.	39	1	Ireland.	Laborer.	Aug. 8, 1884	
James Armstrong.	H		66	5	Ireland.	Tailor.	Aug. 8, 1884	
F. Wm. Birge.	H		60	1	Germany.	Machinist.	Aug. 20, 1884	
William Barton.	C		63	1	England.	Laborer.	Aug. 20, 1884	
Julius Bachman.	F		26	1	Germany.	Brickmaker.	Aug. 20, 1884	
Owen Carroll.	K		65	3	England.	Cooper.	Aug. 20, 1884	
Alfred Dowling.	K		81	2	Ireland.	Baker.	Aug. 20, 1884	
Francis Joseph Dine.	B		67	4	France.	Laborer.	Aug. 20, 1884	
William Hoehn.	K		69	2	Germany.	Wagon maker.	Aug. 20, 1884	
Jeremiah Hurley.	B		67	6	Ireland.	Teamman.	Aug. 20, 1884	
Henry McCullen.	D		73	2	Ireland.	Laborer.	Aug. 20, 1884	
John McLaughlin.	D		55	2	U. S.	Shoemaker.	Aug. 20, 1884	
Patrick McCarthy.	K		52	2	Ireland.	Fireman.	Aug. 20, 1884	
Charles Nelson.	C		72	1	Germany.	Seaman.	Aug. 20, 1884	
David Powers.	O		57	4	Ireland.	Laborer.	Aug. 20, 1884	
Frederick Bible.	B		46	4	U. S.	Thimble.	Aug. 20, 1884	
Frank Uhle.	B		54	4	U. S.	Farmer.	Aug. 20, 1884	
Leonard H. Williams.	E		65	1	Germany.	Agent.	Aug. 20, 1884	
La Fayette Woolworth.	E		59	1	U. S.	Laborer.	Aug. 20, 1884	
William Gildea.	E		64	1	Ireland.	Laborer.	Aug. 20, 1884	
Charles E. Hewes.	Chapt.		70	1	U. S.	Clergyman.	Sept. 6, 1884	
Edward Maddox.	A		67	3	Ireland.	Cook.	Sept. 6, 1884	
Mathew McConnell.	O		63	3	U. S.	Farmer.	Sept. 6, 1884	
Daniel McCarthy.	H		53	2	Ireland.	Laborer.	Sept. 6, 1884	
John Connor.	O		56	2	Ireland.	Engineer.	Sept. 6, 1884	
James Campbell.	O		42	2	U. S.	Ship carpenter.	Sept. 6, 1884	
Charles B. Albert.	O		63	1	U. S.	Painter.	Sept. 6, 1884	
Daniel Burns.	C		52	3	Ireland.	Laborer.	Sept. 25, 1884	
Abram Conley.	A		54	1	U. S.	Laborer.	Sept. 25, 1884	
Abram Brown.	D		61	3	U. S.	Cooper.	Sept. 25, 1884	
John Cullen.	K		65	3	Ireland.	Laborer.	Sept. 25, 1884	
Peter Barnett.	D		78	3	Scotland.	Carpenter.	Sept. 25, 1884	
James Clancy.	H		59	2	Ireland.	Soldier.	Sept. 25, 1884	
Thomas Flood.	B		54	3	Ireland.	Hostler.	Sept. 25, 1884	
Frederick Grasse.	O		49	1	Germany.	Printer.	Sept. 25, 1884	
Patrick Hogan.	K		65	1	Ireland.	Laborer.	Sept. 25, 1884	
Martin Myres.	K		67	1	Germany.	Shoemaker.	Sept. 25, 1884	
John McCauley.	M		78	3	Ireland.	Laborer.	Sept. 25, 1884	
David Norton.	P		43	2	England.	Painter.	Sept. 25, 1884	

LIST OF INMATES ADMITTED — Continued.

RECAPITULATION.

NEW YORK.

	Volunteers.
Infantry	1,401
Cavalry.....	184
Artillery.....	241

UNITED STATES.

Infantry	43
Cavalry.....	1
Artillery.....	17
Navy.....	126

OTHER STATES.

Maine ..	2
New Hampshire.....	2
Vermont.....	2
Massachusetts	10
Rhode Island.....	2
Connecticut.....	10
Pennsylvania.....	13
District Columbia.....	2
Maryland	2
Ohio.....	11
Illinois.....	10
Wisconsin.....	8
Michigan.....	5
Missouri	3
Indiana.....	4
Iowa.....	2
California.....	2
Oregon	1
Washington Territory.....	1

Total from New York State.....	1,826
Total from United States Army.....	61
Total from United States Navy.....	126
Total from other States	92

Total admitted.....	2,105
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Honorably discharged.....	565
Summarily.....	262
Deserted and dropped.....	327
Died.....	251
Present.....	593
Absent.....	107
Total.....	<u>2,105</u>

The nativity of inmates was as follows:

United States.....	783
Ireland.....	707
Germany.....	364
England, Scotland and Wales.....	140
Canada.....	42
Other countries.....	69
Total.....	<u>2,105</u>

Average age, 52 years, 9 months, 26 days.

Average length of service, 2 years, 5 months, 10 days.

TABLE SHOWING THE NUMBER AND CLASS OF DISEASES FOR WHICH INMATES WERE ADMITTED TO THE "HOME" SINCE ITS OPENING TO THE PRESENT DATE SEPTEMBER 30, 1884.

Gunshot wounds.....	353	Sunstroke.....	12
Rheumatism.....	485	Pleurisy.....	8
Heart disease.....	51	Shell wounds.....	37
Hernia.....	151	Epilepsy.....	11
Eye disease.....	22	Injury to spine.....	13
Ophthalmia.....	5	Disease of stomach.....	1
Dropsy.....	5	Asthma.....	41
Loss of leg.....	29	Pneumonia.....	4
Loss of arm.....	31	Malarial fever.....	4
Phthisis.....	42	Bright's disease.....	2
Old age.....	20	Cancer.....	5
Lung disease.....	28	Scurvy.....	2
Fistula.....	7	Loss of foot.....	6
Chronic diarrhoea.....	34	Catarrh.....	2
Injury to leg.....	50	Frozen feet.....	3
Paralysis.....	62	Neuralgia.....	2
Varicose veins.....	32	Blood poisoning.....	2
General debility.....	151	Typhus fever.....	5
Injury to shoulder.....	7	Liver complaint.....	3
Injury to side.....	10	Senility.....	2
Injury to knee.....	13	Lumbago.....	4
Injury to hand.....	23	Varicocele.....	2
Injury to arm.....	11	Erysipelas.....	3
Blindness.....	22	Cystitis.....	1
Partial blindness.....	16	Concussion.....	2
Hemorrhoids.....	12	Injury to elbow.....	1
Stricture.....	6	Injury to collar bone.....	1

Chronic dysentery.....	18	Lacerated finger	1
Vertigo.....	3	Hemorrhage of lungs.....	2
Injury to hip.....	11	Fractured ribs.....	2
Fracture	1	Ulcers	5
Tumor.....	4	Incontinence of urine.....	1
White swelling.....	1	Atrophy	1
Kidney disease.....	23	Nervous debility	6
Dyspepsia.....	8	Loss of use of hands.....	1
Injury to back.....	19	Insanity.....	1
Paraplegia.....	2	Acute orchitis.....	1
Injury to head.....	6	Consumption.....	7
Injury to breast.....	2	Hemorrhage, diabetes.....	1
Fracture of thigh.....	2	Compound fracture of right	
Fracture of skull.....	2	fibula.....	1
Internal injury.....	1	Secondary syphilis.....	1
Bronchitis.....	40	Piles.....	6
Arrow wound.....	1	Congestion of lungs.....	3
Prolapsus ani.....	1	Saber wound	2
Measles.....	1	Salt rheum.....	1
Loss of use of legs and feet..	1	Fever and ague.....	1
Premature old age.....	2	Disease of right testicle.....	1
Deafness	16	Hemiplegia.....	5
Inflammation of bladder....	4	Gastritis	1
Abscess.....	4	Loss of fingers both hands..	1
Bayonet wound.....	3	Enlarged prostate.....	1
Loss of eye.....	10	Loss of both feet, frozen	1
Ulcers on leg.....	9	Kicked by a horse.....	1

SECOND REPORT

OF THE

CIVIL SERVICE COMMISSION

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE JANUARY 28, 1885.

ALBANY:
WEED, PARSONS AND COMPANY,
LEGISLATIVE PRINTERS.
1885.

STATE OF NEW YORK.

No. 42.

IN ASSEMBLY,

JANUARY 28, 1885.

To the Legislature:

I have the honor to transmit herewith the Second Annual Report
of the Civil Service Commissioners.

DAVID B. HILL.

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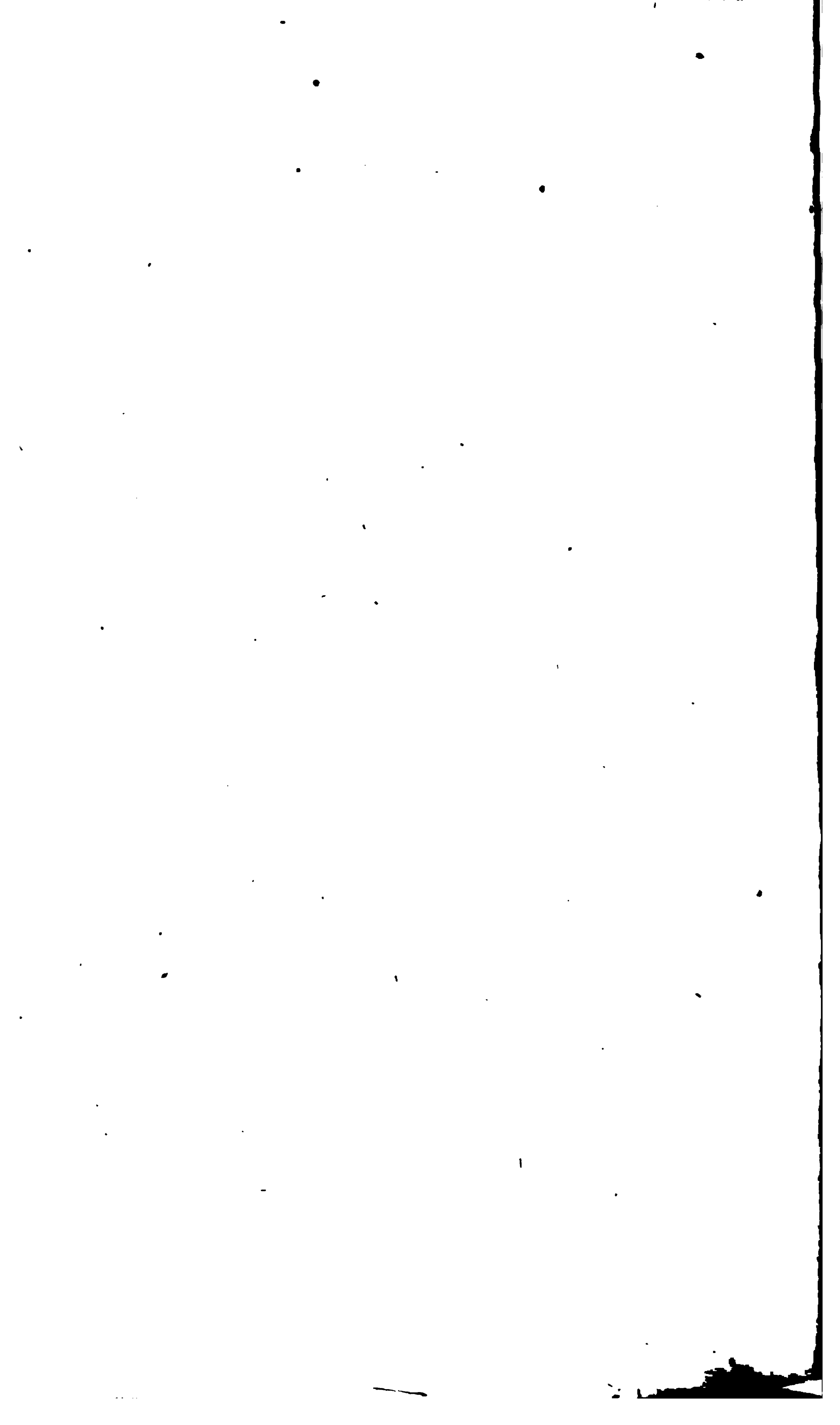
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SECOND REPORT

OF THE

CIVIL SERVICE COMMISSION

STATE OF NEW YORK,
OFFICE OF THE CIVIL SERVICE COMMISSION
ALBANY, *January 26, 1885.*

To his Excellency, the Governor of the State of New York :

SIR—The New York Civil Service Commission has the honor to submit its Second Annual Report, in accordance with the provision of the Act to regulate and improve the Civil Service of the State, and to announce that the extension of the system ordered by the amendatory Acts passed by the Legislature, at its last session (Chapter 357, passed May 24, 1884, and Chapter 410, passed May 18, 1884), has in great part been carried out.

The number of persons subject to Civil Service regulations to be made or approved by this Commission is as follows:—

in the service of the State.....	3,6
in that of the City of New York.....	5,5
in that of the City of Brooklyn.....	1,4
the estimated number in other cities.....	1,7
Making a total of.....	<u>12,2</u>

ENLARGEMENT OF THE STATE SERVICE.

The duties of the Commission have largely expanded by the discovery, from time to time, that numerous and important public employees, who were at first believed to be in municipal or other local service, have been judicially declared to be in the State service. These adjudications the Commission has deemed controlling for Civil Service purposes, and has consequently taken the necessary action to apply the State Rules to all such positions.

Those brought under the State Rules by the decisions referred to are the persons employed by Excise Boards; the officers and employees of the various courts, both of general and local jurisdiction.

in cities; and the physicians required to be appointed under the general health laws of the State, designated as "Health officers."

Classification, methods of examination, and the selection of special Boards of Examiners, for these added positions became necessary, and have received appropriate action by the Commission.

The Commission has been conscious at all times that the change introduced by Civil Service methods must necessarily be gradual, and cannot with propriety progress faster than the changes can be supported by intelligent public sentiment. An instantaneous change from the license of the patronage system to the highest conceptions of Civil Service methods, was not always practicable. The transition period demands wise and prudent action, and a discreet recognition of the fact, that the opinions and prejudices that have grown up under a different system of long standing, cannot at once be supplanted, but will yield as the evidence of better modes accumulates.

With this conviction the Commission has sedulously aimed to secure the co-operation of public officers, and of persons holding positions of authority and influence.

It has conferred with and invited expressions from the heads of departments in the State government; the officials in charge of the asylums, reformatories, and prisons of the State; the mayors and other officials of cities; the members of the judiciary; the various associations of the bar; the medical profession and civil engineers; the State Board of Health, and other boards; the principals of normal schools; the presidents of colleges, and numerous others, whose experience and standing rendered their views desirable.

The Commission has received valuable suggestions and assistance from these various sources, and in the main has met a fair degree of co-operation on the part of public officials, and acquired important and useful information.

In April the Commission, in view of decisions by which the employees connected with the courts of the City of New York have been adjudged to be in the service of the State, and not of the Municipality, asked from the Judges information and advice: and the full and valuable responses of Chief Judge Daly of the Common Pleas, and of Chief Judge Sedgwick of the Superior Court, will be found in the Appendix.

Judge Daly remarked, in concluding his letter: "I beg leave to say that the Commission may always feel assured, to use your own language, of the co-operation and moral support of the judges of our Court;" and Judge Sedgwick said, in closing: "You will have perceived that what legal questions may be involved in the matter that may have been referred to, there is none that has a practical bearing, or which, as we think, should now delay you in proceeding under the act of 1883, according to your own opinions as to the application of the provisions of the act."

The Commission next asked the Bar Association of the city, through its President, James C. Carter, Esq., to appoint a com-

mittee of conference, with a view to the adoption of a scheme of classification and examinations, with the assistance and approval of that body.

The Bar Association, after the summer recess, acted upon request, and appointed as their committee of conference, O. C. Brainard, Esq., chairman; Elial F. Hall, Esq., Charles W. Day, Esq., and a conference was held in the City of New York, attended by this committee of the Bar Association and the Board of Examiners appointed for the Court officials headed by the Hon. Wm. Arnoux, two members of the Board of examiners for the Court officials of Brooklyn, two of the State Commissioners and the State examiner; and a basis of action was agreed upon, and the work of preparation is now in progress.

CIVIL SERVICE EXAMINERS.

The fee allowed by the Act to examiners not in the service of the State, is five dollars per day, a sum which is generally quite inadequate to require those whose services it is important to secure, men of high character and accomplishments, whose impartiality is free from the slightest suspicion. The conferring of certificates of eligibility to office is a judicial act, and the position of examiner is one of great dignity and importance.

Happily the magnitude and importance of the competitive examinations have been properly understood by those whose assistance as examiners has been asked, and that assistance has been promptly rendered in nearly every case without compensation, but from motives of patriotism and honor which are entitled to acknowledgment.

The Boards of Examiners in the State and Municipal Service are as follows:

STATE EXAMINING BOARDS.

Albany.

Hiram E. Sickles, Chairman,
Chas. W. Cole,
Willis E. Merriman,
Richard G. Mills,
Jno. G. Clifford, Sec'y.

Utica.

Edward Curren, Esq.,
Wm. Kernan, Esq.,
Jos. S. Lowry, Esq.

Syracuse.

Alfred Wilkinson, Jr., Esq.,
W. S. Andrews, Esq.,
Francis E. Leupp, Esq.

Auburn.

The Warden,
Hon. John D. Teller,
Orlando Lewis, Esq.

Clinton.

The Warden,
John B. Riley, Esq.,
Hon. Wm. P. Mooers.

New York Courts.

Hon. Wm. H. Arnoux,
Hon. Jacob F. Miller,
Chas. A. Davison, Esq.,
George W. Green, Esq.,
Delos McCurdy, Esq.

Rochester.

Lewis P. Ross, Esq.,
J. P. Varnum, Esq.,
Wm. F. Peck, Esq.

Brooklyn Courts.

Edward M. Ivins, Esq.,
Harrington Putnam, Esq.,
Frederick P. Bellamy, Esq.

Buffalo.

Hon. Jas. O. Putnam,
Leonard Chester, Esq.,
T. Guilford Smith, Esq.

Batavia.

John H. Ward, Esq.,
Horace H. Hutchins, M. D.,
Carlos A. Hulls, Esq.

Elmira.

Hon. Seymour Dexter,
Dr. Wm. C. Wey,
Francis Hall, Esq.

For Excise Board, New York City.

S. Hastings Grant,
Walter D. Edmonds,
Thomas Boese.

For Local Health Officers.

Samuel B. Ward, M. D.,
Charles E. Jones, M. D.,
Alfred L. Carroll, M. D.,
E. H. Parker, M. D.

For the New York House of Refuge.

B. B. Atterbury,
Wm. S. Keilly,
Nathaniel Jarvis, Jr.

The scientific and medical gentlemen who assisted in the examination for the post of assistant physicians in the *State Hospital at Poughkeepsie*, were as follows :

Dr. Stephen Smith, Chairman.

Prof. Henry Drisler, Examiner in General Education.

Dr. James S. Leaning and Dr. Darwin E. Hudson, Examiners in General Medicine.

Dr. Allan McL. Hamilton, Examiner in the Anatomy, Physiology, Pathology of the Nervous System.

Dr. Theodore H. Kellogg, Examiner in Insanity.

Dr. A. Nelson Bell, Examiner in Preventive Medicine.

Dr. Lewis Balch, Examiner in Surgery.

Dr. A. E. Macdonald, Examiner in Administrative Qualities.

THE AMENDED LAW FOR CITIES.

Under the original "Act to regulate and improve the Civil Service of the State," only seven cities—those containing fifty thousand inhabitants and upwards—were subject to its provisions; and in those cities very limited authority was given to mayors, and the exercise of that authority was entirely optional. Authority similar to that of mayors was, however, given to various heads of departments. The imperfection and incongruity of this system were

sufficiently obvious, and attention was called to the subject in the last report of the Commission.

The Legislature wisely concluded to remedy these defects, and to make the system thorough and harmonious, by rendering it mandatory in cities: and by vesting in the mayors sole authority to establish regulations for every department of municipal government, except only the educational, which the Commission had recommended should be excepted, on account of its peculiar character and its *quasi status* as part of the educational system of the State.

The extension of Civil Service methods to all the cities of the State was not favored by the Commission, for the reason that in the smaller cities the offices to be affected were too few in number, and too unimportant to present any urgent necessity for this reform in its incipient stages; but the Commission refrained from making any suggestion to the Legislature on the subject.

After the law was enacted the Commission promptly proceeded to give effect to its provisions, but endeavored to do so in a liberal and conciliatory spirit, in order to have the benefit of the friendly co-operation of municipal authorities.

The provision of the amendatory acts requiring the approval of municipal regulations by the State Commission, while judicious in itself, largely increased the duties and responsibilities of the Commission.

It soon became apparent that to secure uniformity in municipal regulations and harmony with the rules of the State Service, and in some instances to have any action taken, it was necessary for the Commission to take the initiative by preparing regulations to be submitted to the mayors for their adoption. This was accordingly done, and the various mayors with reasonable promptitude and public spirit have adopted the general scheme of regulations recommended by the Commission, and after formal approval by the Commission, have promulgated them in their respective cities.

The only cities that have failed to comply with the statute are: Hudson, Watertown, Oswego, Rome, Elmira, Schenectady, Newburg, and Lockport. (Buffalo Regulations nearly ready.)

The municipal regulations established by the separate cities, and which in obedience to the acts are given in the Appendix, are in entire harmony with the State rules in all essential matters. The classifications, the schedules, the rules for entrance to the service, and for examinations and promotions, are in substance identical with the State Rules so far as the nature of the service permits.

The Police and Fire Departments of cities have no equivalents in the State Service, and the regulations for those departments have been prepared, upon careful consideration, by gentlemen in the cities of New York and Brooklyn who have brought to the work great intelligence, earnestness, and good judgment. The able report of a special committee of the Civil Service Reform Association of New York, relative to the Police and Fire Departments,

prepared at the suggestion of the Commission will be found in the Appendix.

Under the regulations now existing for admission to the police service, and for promotion, if fairly applied, very conspicuous reform in the interest of good order and greater efficiency seems assured in that important branch of the service. The elimination of patronage and favoritism by these regulations, and the substitution of ascertained merit as the sole ground of appointment and promotion, cannot fail to elevate the standard of the force, and to stimulate its members with the honorable incentive to good conduct and efficient service afforded by the certainty of the reward of merit.

CITY OF BROOKLYN.

The first Annual Report of the Civil Service Commission of Brooklyn (Appendix H.) gives an interesting and satisfactory account of the work accomplished since its first regulations were prescribed by Mayor Low, on December 15, 1883, and the observations and suggestions of the Brooklyn Commissioners exhibit a careful study of the philosophy of the system as developed in their experience. Whatever the imperfections in the application of the new methods, those methods they regard as a great and unmistakable improvement upon the previous methods of selecting the employees of the city.

The pressure for appointments upon the officers of the departments has very largely disappeared. The humiliating sense of personal favor, and the demoralizing weight of political obligations have begun to abate, and there is being gradually established an impression of free and open fairness. These Commissioners have been brought to the conclusion that an open, free competition is the essential condition in the reform of the civil service, and that such a competition can be advantageously used for nearly all classes of the municipal servants.

The Brooklyn Commissioners are disposed to make the examinations as thorough and rigorous as is consistent with the obtaining of eligible lists sufficiently numerous for the needs of the city service; but in these examinations literary and clerical qualifications have not been regarded as of the first moment, but rather those which will easily test, as required by the act, "the relative capacity and fitness of the person examined to discharge the duties of that service to which they seek to be appointed."

In the places of policemen, firemen, watchmen, and the like, physical strength, endurance, and agility have been rated as of first-class importance; in such places as those of draughtsmen, inspectors of buildings, plumbing, streets, or sewers, practical familiarity with the work done. In the case of levelers and rodmen in the engineer's bureau, scientific training very high; and practical experience as of lesser weight. In the case of foremen of street repair gangs.

requiring vigorous, persistent and practical ability to perform their full share of work, and to do it well, actual successful experience was held the chief requisite. A competitive examination for "foremen of street-repair gangs," described in the report, embraced the practical details of the work, the use of tools, the treatment for foundations, the candidate's former occupation and employment, etc., and the result created great confidence in the extension of the competitive test to all like places.

Of the competitive examination in the engineer's bureau notice was given to many technical schools and colleges, and a most intelligent set of men presented themselves for examination.

The Commissioners propose, as part of every examination, a series of questions to the candidates and those who vouch for them, calling for specific and detailed information about occupation, experience, habits, character and reputation.

They think that the examinations will attract a larger number of competent candidates, as the fairness and the permanency of the system are understood, and lingering doubts are dispelled that political and personal considerations have weight with civil service examiners, as in the past, in executive officers.

In regard to pass examinations, which the experience of the examining board has found "very unsatisfactory at the best," and among the features of which is named the imputation which a rejection of an appointee might seem to cast both upon him and upon the officer who nominated him, "they recommended open competition as far as was practicable, and as to places where competition could not wisely be tried, to leave to the appointing officer an undivided responsibility."

The number of positions in Schedule A exempt from examination is ninety-three. Those in Schedule B, filled solely by competitive examinations, are divided as follows:

Clerks, book-keepers, copyists.....	165
Various positions in the departments of city works.....	125
Positions in the police.....	714
Positions in the fire department	331
Positions in the health department.....	34
Remaining positions	49
Total .	<u>1,418</u>

The total salaries paid to the holders of these positions is \$1,466,686.

Appendix III of the Brooklyn Report, giving the number of persons who have entered the competitive list with their education, average age, etc., shows that of the persons who succeeded in reaching the eligible list, 215 received a common-school education, 148 a scientific, and 36 a collegiate education.

Among the gentlemen who have served as examiners in the Brooklyn service from December 15, 1883, have been the following:

In Schedule B, Messrs. Ethan Allen Doty, John C. Orr and Edmund F. Clyne:

In Schedule C, Edward M. Shephard, Frederick Cromwell, and John H. Shuman:

For Draughtsmen, Levellers, and Rodmen—Professor Geo. W. Plympton, of the Polytechnic Institute, Professor Alfred W. Compton, of the College of the City of New York, and the late Isaac Newton, the Chief Engineer of the Aqueduct Department in New York.

The experts upon the other examinations:

For Building Inspectors—Richard B. Eastman, Esq., Architect.

For Foreman of Street Repair Gangs—D. L. Smith, Esq., of the New York Water Purveyor's Office.

For Plumbing Inspectors—Mortimer J. Lion, Esq., President of the Brooklyn Plumbers' Association.

For Sewer Inspectors—C. H. Myers, Esq., of the New York Department of Public Works.

For Watchmen—Edwin A. Lewis, M. D., Police Surgeon of this city.

For Street Inspectors—J. Rickard, Esq., of the City of New York.

For admission to the Police—Messrs. Charles F. Henry, John Rueger, and William H. Brownell. The report of the Brooklyn Commission will be found in the Appendix.

The Report is signed by ETHAN ALLEN DOTY, Chairman of the Commission.

EDWARD M. SHEPHARD,
JOHN H. SCHUMANN,
EDMOND F. CLYNE,
WM. H. BROWNELL,
CHARLES F. HENRY,

JOHN RUEGER,
J. FRED. MOORE, M. D.,
HENRY M. LEWIS, M. D.,
ISAAC H. CAREY,
J. AUGUSTUS HEALY,

Commissioners.

CITY OF NEW YORK.

A report given in the Appendix, from Messrs. Everett P. Wheeler, Edwin L. Godkin, and E. R. Robinson, composing the Advisory Board, dated December 10, 1884, addressed to Franklin Edson, Mayor, and approved by his Honor, was made in accordance with a request from this Commission. It gives a brief but comprehensive view of the progress of the Civil Service system in the city of New York, from its partial beginning in 1883 under the early regulations of the Mayor, which continued in force until the 29th of August, 1884, to its complete establishment under the man-

datory provisions of the amended act. Under the present regulations, sixty-six in number, which were approved by this Commission on the 23d of August, 1884, the city was divided into seven schedules, which are as follows :

A. Deputies authorized to act for their principals, and persons necessarily occupying a strictly confidential position.

B. Clerks, copyists, recorders, book-keepers, and others rendering clerical service.

C. Policemen of the Police and Park Departments and the uniformed force of the Fire Department.

D. Persons whose duties require expert knowledge not included in E.

E. Physicians, chemists, nurses, orderlies, and attendants in City hospitals and asylums.

F. Persons not included in the above and not laborers.

G. Laborers.

There are three Boards of Examiners, each composed of three persons for positions in Schedules B and C, one for positions in D, and one for those in E and F; all under an Advisory Board appointed to have the general supervision of the working of the system, and to aid the Mayor in its administration.

The great majority of these places are thrown open to public competition, but it has not yet been found practicable to subject to such competition all places demanding special experience, such as those of physicians and surgeons in the City hospitals and asylums.

In its details of the scheme relating to police and firemen, the report may prove of interest not only to the inhabitants of that city, but of cities in this and other States.

After the filling out by the applicant of a schedule, with a detailed statement of his health, occupation, and experience, and the approval of his physical condition by an official surgeon, he is examined in reference to his physical aptness and dexterity. The report says : " This portion of the examination is new. Experience has seemed to indicate that a purely medical examination, while it tends to reject all persons of defective physical organization, fails to indicate those who have distinct physical excellence, and it seems clear that one is as important as the other. A policeman might, for example, be in perfect health, yet if the condition of his frame were such that he could not run, that he could not shoot with accuracy, that he could not hold his own in a scuffle with a burglar, he would be an undesirable member of the force. He is also required to submit references from responsible persons as to his habits and reputation, and in the case of a policeman the captain of the precinct in which the applicant resides is required to make personal inquiry of them and to report the results of such inquiry. In the case of firemen this duty of inquiry is devolved upon the chiefs of battalion. All these statements are laid before the Examining Board for their consideration.

"The applicant is then examined as to his experience in any position tending to qualify him for the branch of the service which he seeks to enter, and then as to what perhaps might be called his intellectual qualifications. He must be able to read, to write, to make a clear statement of the substance of matter orally communicated, to answer intelligently as to the requirements of the rules of the police or fire department relating to the duties of the position applied for; and he is further to be questioned, if he seeks appointment as policeman, with reference to the location of streets, public buildings, and other subjects respecting which strangers in the city naturally inquire. In the case of firemen these questions are directed to the location of streets, and the location and construction of buildings with special reference to precautions against fire. Having all these data before them the Examining Board is now required to make up a statement of results."

The fundamental rule in reference to examinations is that they shall be held "on such matters as will fairly test the relative capacity and fitness of the persons examined for the particular duties with which they seek to be charged." No candidate is placed on the eligible list unless his standing is seventy on a maximum of one hundred, and the selection made from three or sometimes five names sent to the appointing person is subject to the test of probation. In the case of promotion, if no person shall be found in the service suitably qualified, it is thrown open to public competition. The Advisory Board remark that competitive examinations eliminate the elements of favoritism and partisanship from appointments to office as far as possible, and suggest that the skill and judgment of the Examining Board may be and are aided by the services of experts, and that at least one member of each Board which have to determine the fitness of all persons, for whose duty expert knowledge is required, should be himself familiar with the subject or qualified for his duty by practical experience.

The Advisory Board further remark, that "the inevitable effect of the old system was to concentrate power in the hands of political leaders, and to make the whole official corps a band of mercenaries who supported the fortunes and followed the banners of political leaders.

"Nothing could be more opposed to the whole spirit and genius of American institutions. Our Government in theory is based on an equality of privileges and rights. No legislation can give equality of natural endowments, and consequently none can give an equality of acquisitions or possessions. But what this Government first of all Governments undertook to do was to give every citizen an equal opportunity before the law. Nothing can be more hostile to this than the idea that no man can obtain an appointment who has not some political backing, who has not some influential friend, who either from motives of friendship or for reasons of interest is disposed to press his appointment upon the appointing power. And nothing can be more conducive to an unfaithful and inefficient discharge of

duty than the feeling on the part of an official that his continuance in office must depend not upon his faithful service but upon his fealty to the men who appointed him or who keep him where he is."

The number of positions to be filled by selection from those who have passed in competitive examination is 5,540, classified as follows:

Fire Department.....	819
Police Department.....	2,741
Department of Public Works.....	368
Finance Department.....	114
Counsel to the Corporation.....	21
Department of Taxes and Assessments.....	43
Health Department.....	121
Department of Docks.....	162
Office of <i>The City Record</i>	8
Department of Street Cleaning.....	76
Department of Public Parks.....	156
Department of Public Charities and Correction.....	836
Mayor's Office.....	16
Municipal Service Boards.....	3
	<hr/>
	5,486
	<hr/>

The returns as to the education of applicants were incomplete, from some omission in the earlier schedules.

The present examiners of the New York City Commission are:

For Applicants in Schedules B and C,

A. R. MacDonough, J. Seaver Page, Wyllys Hodges.

In Schedule D,

Arthur H. Dundon, Dan'l B. Smith, James Moir.

In Schedules E and F,

F. Herring Burchard, M. D., F. Tilden Brown, M. D., Thos. H. Manley, M. D.

The report, in view of the difficulties which have attended the task of the late Mayor, by whom the scheme was voluntarily inaugurated, and his very able Board of Advisers, is full of promise for the future under the administration of his successor.

COMPETITIVE EXAMINATIONS.

The act to regulate and improve the Civil Service of the State by section 2, requires that the rules to be prepared by the Governor with the aid of the Commission, shall provide for open Competitive Examinations for testing the fitness of applicants for the public service. "Such examinations shall be practical in their character,

and, so far as may be, shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined, to discharge the duties of that service into which they seek to be appointed."

It is further provided by the same section that "there shall be non-competitive examinations when competitive may not be found practicable," and these provisions are now embodied in the regulations both of the State and of the cities.

As the system broadens in its operation and becomes better understood, the principle of competitive examination seems to advance steadily in the public favor, as one that should supersede to a greater extent than at present appointments by nomination. A chief difference between competitive and pass examinations has been well described in the remark, that "the examiners, instead of conferring a certain guarantee of goodness, are required to select the best."

In England both parties, from actual experience, long since reached this conclusion, despite the strong objection made to the introduction of so "democratical" a scheme, as it was called, and one which endangered the privileges and prestige of the aristocracy by putting all applicants on an equal footing. The system now rests on the public approval of the view expressed by John Stuart Mill, that the principal object which any honest reformer desires to effect by political changes, namely, that the administration of public affairs should be in the most competent hands as regards the permanent part of the administrative body, could be answered by the competitive system, so far as it is possible for any human contrivance to effect it, and that its adoption would form an era in history.

The competitive method is supported by reasons so obvious and cogent, that argument in its favor seems almost superfluous. Competition is the law of nature, and is universal in its application. It prevails in every department of human activity, and is the test by which men are measured in every profession, calling, and sphere. It is the only absolutely democratic rule, and therefore consonant with the spirit of our institutions, founded on the political equality of men. By eliminating the elements of favoritism, nepotism, and partisan recompense, it stimulates manly aspirations, develops independence in thought and character, protects the equal rights of every citizen, and secures fair play against selfishness and presumptuous mediocrity.

The force of the arguments in its favor induced even the British Crown to surrender its immemorial prerogative of unrestricted appointment more than thirty years ago, and to open its whole public service to competition. And so satisfactory have been its results, that it has become the fixed policy of the Empire, approved alike by the Crown and its subjects.

If the policy is adapted to a monarchical country, it must in the nature of things be vastly more appropriate in ours, where distinctions are not recognized and prerogatives are distasteful.

The highest patriotism requires that the official service, which consists solely of public trusts, shall be filled upon some principle

essentially democratic in its nature, one that is likely to secure the best trustees, and that will tend to preserve our institutions in their simplicity and purity.

This principle is found in the methods of Civil Service.

The very simple formula, that under a free government where equality of political rights exists the people have the right to be served in official positions by those best fitted to serve them, whose service can be procured for the compensation allowed, and that the fitness for such positions should be ascertained by disinterested persons acting under the sanction and the restraints of law, expresses the essence and the sum of Civil Service Reform, and it may now be said that the principle has become the accepted policy of our great State, and in the broader sphere of national affairs.

Among the notable effects of the competitive system which are observable from the highest position to which it applies in the State government, to the lowest in the hospitals and asylums, is the fact that the incumbents are conscious of a new dignity and self-respect, as "public servants who have obtained their situations in an independent manner through their own merits."

A chief objection to competitive examinations, that they may introduce as officials in a department persons who are strangers to the Chief, and whose personal fitness for the place can only be tested in part by an examination, is answered by the provision of the Act, that a term of probation shall pass before any absolute appointment or employment can be made.

This term has been fixed at three months, and the officer under whom the probationer shall serve during that time is to report in writing to the appointing officer the facts showing his character and qualifications.

This feature of the system affording ample opportunity for observation, and requiring a record of the facts, allows the use of the same means available under the patronage and nomination systems, to test the moral and practical fitness of an applicant for the place, and fully protects the appointing officer. And the prospect of promotion on the part of the appointee encourages habits of order and diligence, and affords a permanent stimulant to excellence in his discharge of the duties of the position.

It is provided by the fourth rule that the power to remove, existing by law, on the part of any officer, is not impaired by the rules. Such a power in the cases of incompetency, irregularity, misconduct, indolence, or any other cause interfering with the proper discharge of the duties of the department, is regarded as essential to the fair working of the system established by the Act; and the danger of an abuse of this power which was justly feared when the removing officer could without restriction fill the vacancy he had created seems greatly lessened when the vacancy is to be filled from the three highest under the restraints of law. In all such cases it would seem advisable to remove restraints which may still exist upon the power of removal.

The Commission, in its desire to accomplish without delay and with the least possible friction the inauguration of the system established by the Act, has occasionally deferred in the matter of classification to the opinions of heads of departments, as notably in the case of assistant physicians in Lunatic Asylums, where the head of the institution, on whom rests the chief responsibility, has deemed it unsafe to dispense with the right of nomination and to open the place to outside competition. An opposite opinion has recently been practically expressed, and as it would seem most successfully, in the Hudson River State Hospital at Poughkeepsie, where the managers availed themselves of a competitive examination to fill two positions of importance.

In considering the propriety of applying competitive examination (or if that were impracticable, non-competitive examination) to the positions of principals and teachers in the Normal Schools as has been done with success in other countries, the Commission addressed a circular (Appendix C) to the heads of the Normal Schools and others officially connected with the public instruction, to which some replies were received.

Under the conservative views which have guided its action in other cases, and in the belief that the officials connected with the Normal Schools are not yet prepared to apply the system of competition to those institutions, the Commission has deemed it expedient for the present to place the instructors in those schools in Schedule A, which exempts them from examination under the rules of the Civil Service, and leaves the local boards at liberty to make their selections upon such examinations as they may deem adequate, as they have done in the past with results which appear to have been generally satisfactory and free from imputation of partisan bias.

THE RELATION OF COMPETITIVE EXAMINATIONS TO PUBLIC EDUCATION.

The satisfactory experience of the last year in regard to competitive examinations, and the indications that this is the feature of the civil service scheme, against which whatever opposition shall be made will be chiefly directed, seem to emphasize the importance of the suggestions which the Commission presented in its first report (pages 19, 20 and 21) touching the close connection between the competitive scheme and popular education given at the public expense, and the importance of maintaining a certain harmony between the training given by the State, and the requirements by the State for admission to the public service.

The idea sometimes entertained that competitive examinations are simply an incidental and optional feature of the system, an idea expressed in the cry "Support Civil Service Reform, but down with the competitive examinations" is one in no way justified by the spirit or letter of the Act, and one quite inconsistent with a right appreciation of the system.

"The act to regulate and improve the civil service," and which defines the duties and powers of the Commission, enjoins open competitive examinations for testing the fitness of applicants for the public service; and it is only in cases where competition may not be found practicable, that the Act provides for non-competitive examinations.

When the Commission was preparing to inaugurate the system, the practical methods of Civil Service Reform were but little understood, save by the few who had studied the subject and were familiar with its working, partially in our national service and more generally abroad.

Crude and inexact ideas were dogmatically expressed in condemnation of competitive examinations; and occasionally burlesque examination papers perpetrated as a pleasant jest, or perhaps with the intention to deceive, imposed upon the credulity of some who were imperfectly informed of the new system. In consulting the heads of departments and institutions, touching the duties and proper classification of their subordinates, they occasionally deemed it impracticable to introduce competitive examinations without injury to the public interest; and under such advice from those whose concurrence in the scheme was almost essential to its successful working, the Commission in some cases yielded to the requests thus made, as, for example, in the Normal Schools and the Board of Excise, where it has avoided for the present placing the teachers and inspectors in Class B., for competitive examination.

But the Act which defines the policy of the State, and the duties of the Commission, makes competitive examinations the rule, and non-competitive examinations the exception; and it would seem from the experience of the Commission that the better the subject is understood, the more decidedly is the Act approved. The fact that the rules adopted by a Republican mayor in the city of Brooklyn, and those framed by a Democratic mayor in the city of New York, have in each case with judicious skill been amended and enlarged in accordance with the spirit of the Act, goes far to justify the belief, that competitive examinations are to be the basis in practice as well as in theory, of the Civil Service System in this State, and of the States which have already begun to follow the example of New York.

It seems noteworthy, that in the second year of the Civil Service System, there have been developed some rather novel methods, suggested in each case by the occasion, and admirably adaptable to competitive examinations, to determine actual fitness for the posts to be filled. This was the case as regards the highest scientific attainments requisite in the treatment of the insane, as shown by the report of the Chief Examiner touching the State Hospital at Poughkeepsie; and again, in regard to the practical experience essential to the good management of city streets, required by a foreman of a "street-repair gang," as was successfully tested at Brooklyn; and yet again, to test the carefully defined traits —

moral, mental, and physical — with the new tests of strength, capacity, agility, and endurance, which will hereafter be required from the incoming policemen of the two cities.

It is rapidly becoming clear that the system of competitive examinations is easily applicable to almost every subordinate post, however high, in every branch of the public service, State or municipal. In Ireland, the four national examiners of the public schools are selected by competitive examination, and a note of the subjects for examination gives an idea of the varied scientific and scholarly attainments in which the applicants must be versed.

The class of persons in this State interested in this subject has been increased during the past year, by the opinion already alluded to of the Attorney-General, that women "have the right to apply for examination under the Civil Service rules, with a view to appointment in the service of the State." This decision is in harmony with the rule in the National Civil Service Commission, which recognizes the equal right of women to compete for places.

The close relationship of competitive examinations to popular education has been a constant topic of remark and discussion with the Civil Service reformers, first of Great Britain, and then of the United States.

In England when, in 1870, after a long struggle, the competitive system was made general, the public schools were by law for the first time required to be supported by general taxation; and it was said that "in England the opening of the Civil and Military Service, in its influence upon the National Education, was equivalent to a hundred thousand Scholarships, and exhibitions of the most valuable kind."

At home our Civil Service reformers have noted with pride and interest the statistics which have identified the competitive system, not as was rashly predicted, with the higher collegiate education, which was confined to the few; but with the common schools, whose advantages were intended for the many. Governor Cleveland gave a seasonable reminder of the reciprocity of the two systems, when he said in his last annual message to the Legislature, that "the children of our citizens are educated and trained in schools maintained at the common expense, and the people as a whole have a right to demand the selection for the public service, of those whose natural aptitudes have been improved by the educational facilities furnished by the State."

The pride and affection with which the people of the State justly regard their Common School System must be enhanced when they remember that the common school opens the way to the knowledge, the character, and the practical experience, which will give to its pupils an equal chance to compete for employment in the Public Service, and will thus contribute to the excellence of the service, the comfort and interest of the people, and the dignity of the State.

Of persons examined in this State and in the cities of New York and Brooklyn, the proportion educated in the common schools has been seventy-two per cent. In the National Service, of those who have entered through competitive examinations sixty-five per cent were educated in the common schools alone (first report U. S. C. S. Com., p. 31). The average age of those examined in this State has been thirty-two years, a fact which, while not without significance as indicating the practical common sense character of the examinations, as testing capacity, experience, and fitness, disposes of the fear which has been sometimes indulged, that in competitive examinations success would be monopolized by young men fresh from their studies and without experience.

Both the education and the age in these cases seem to justify the conclusion that our common schools, when rightly conducted, although giving instruction only in the primary branches, do so develop and improve the character of the pupil, inculcating the principles of Christian morality, exercising and strengthening his thinking powers, and inducing a manly and intelligent exercise of his judgment, that the training of the public schools, with the habits they encourage of order, punctuality, obedience, self-respect, and a sense of personal responsibility, enables the pupils thus instructed to compete in the qualifications which the State demands for her Civil Service, on an equal footing with those whose larger wealth or social position has afforded them the advantages of a higher education.

In this State the opening of thousands of places in the Civil Service to a fair and equal competition, and the abundant proof that the common school, fitly conducted, is found equal to the task of training its pupils for success in that competition, affords both to the State and to individual citizens a new interest in the popular education provided by tax payers, that it may have as far as possible a standard of uniform excellence, marked by the more approved methods, in order that it may keep pace at once with the advancing requirements of the State, and with the necessity of supplying the education and training essential to fit for those requirements the rising generation of the people.

Of the popular education of this State given under its authority in the public and normal schools which are supervised by the Department of Public Instruction and School Commissioners for each county, some statistics are given in the report of the Superintendent of Public Instruction. During the year 1883 the common schools had 1,041,089 scholars, the normal schools, 6,270. The teachers in the common schools were: Men, 6,723; women, 24,847; making a total of 31,570. (Report 1884, p. 19.)

The very interesting reports of the Department of Public Instruction, with the special views, statements and recommendations of School Commissioners, blend with eulogies of the system a frank disclosure of grave defects, both general and local, with thoughtful suggestions for their correction; and apart from the courses of

study, some of the reports go to confirm the startling fact announced by that distinguished expert, Dr. Cornelius R. Agnew, to the State Board of Health, that "all over our State there are schools in which the effects of overcrowding and insufficient food, and other preventable causes of disease, are telling disastrously on the health of their inmates, and so are seminaries or seed-places from which legions of children go out to recruit the ranks of long-lived paupers." One School Commissioner writes (from Lowville, Lewis county, December 1, 1883), "This school-house murdered one teacher and fastened disease upon another for life."

After the last report of the Superintendent of Public Instruction, the Legislature enacted a law, providing that after the 1st of January, 1885, no certificate should be granted to any person to teach in the public schools who had not passed a satisfactory examination in physiology and hygiene, with special reference to the effect of alcoholic drinks, stimulants, and narcotics, and directing the proper local authorities to provide for the instruction of all pupils in the same. (Laws of 1884, chap. 30.)

In its first report, the Commission, in obedience to the instruction to make any suggestions it may approve for the more effectual accomplishment of the purposes of the Act, discussed (pages 19, 20, and 21) the close connection between the Civil Service scheme and popular education given at the public expense, and, after observing that "education by the State furnishes an argument for insisting on intelligence as well as capacity on the part of those who are to serve the public in official positions, and to be compensated for their services at the general expense, falling alike on all classes of citizens," the Commission remarked: "Justice, both to the State and the rising generation of citizens, demands that whenever education is given at the public expense, it should be such as to accomplish the object which alone could justify the expenditure."

It declared that it was "deeply impressed with the importance of more careful attention to the education, the health and moral and physical training of the children of the State, who are in schools or institutions supported at the public expense;" and "that the rising generation should have the benefit of whatever systems or methods will most certainly secure to them the best moral, intellectual and physical instruction, to fit them not merely for the ordinary duties of citizens, but to prepare them to enter the public service, if they should desire to do so."

Whether we look to the advantage of the State and the cities in the improvement of the standard, intellectual or physical, to be attained in the public service by competitive examinations; or to the reasonableness of satisfying the people of the State with the sufficiency of the education afforded by the State, it seems clear that both the State Government and the people should recognize the truth, that to make the Civil Service system an entire success, all good citizens should cordially lend their aid and influence, and each in his

own neighborhood can do much to secure in the education given under the authority of the State a uniform excellence; so that all parents whose children are educated at the public expense may feel that they enjoy a fair and equal chance for success in the competitive examinations for the public service; and that the system, so far from being partial and unequal, merits the eulogium pronounced upon it by Mayor Low, when he said, in his recent message: "There is a fairness and openness about it peculiarly American, and smacking of all that is best in the American love of fair play, and the American demand for equal treatment of all citizens."

THE THEORY OF THE STATUTE.

The Legislature in the enactment of the Civil Service statute established a plan largely executive in its nature. It provided the instrumentalities, and gave certain general directions, but intrusted the execution to the executive power. It was foreseen that many steps must in the first instance be tentative, and that some mistakes would inevitably be made. Power for the summary correction of mistakes was indispensable to give reasonable flexibility to the new methods. This was deemed preferable to arbitrary and rigid enactments that could only be changed by the slow processes of legislation. The Legislature, therefore, lodged in the Executive authority of the State power to apply the system it had created by making the classification and the rules, with the right to amend them from time to time, as occasions might arise. The same theory was applied to cities, and like power conferred upon the Mayors, the executive heads of those divisions of government.

For the State at large, a Commission was provided for, to be selected by the Governor, and to hold office at his will, and also to be non-partisan in its composition and its action. The function of the Commission was to aid the Governor, as he might request, in preparing suitable rules for carrying the law into effect, and to perform the other detail work specified in the act, as directed by the Governor.

The whole authority of the Commission is subordinate to the superior power of the Governor. The Commission may recommend rules and modifications, but no rule has vitality until approved and promulgated by the Governor. The authority given to the Commission by the amendatory Act of 1884 to approve city regulations before they can become operative, is exercised in behalf of the Governor to preserve harmony between those regulations and rules established by the Governor.

In confiding this power to the Governor, the Legislature only laid down certain general principles to be observed, which were deemed fundamental, leaving the executive officer intrusted with the power free to exercise his own best judgment within the boundaries of those principles.

The first and leading principle declared in the Act is that the rules shall provide, so far as the conditions of good administration will permit, for open competitive examinations for testing the fitness of applicants for the public service, and that such examinations shall be practical in their character, and, so far as may be, shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of the service into which they seek to be appointed.

The statute thus devolves upon the executive authority power to create rules under the limitations and for the purposes so clearly expressed. Large discretion is involved in the exercise of this power, and also the incidents of correcting, amending and improving the rules, as experience shall indicate changes to be necessary or expedient.

This power, for wise reasons, should remain intact in the hands of the Executive. Any legislation taking it from the Executive, or placing its exercise under greater restriction, would seriously impair the system, destroy its unity, retard its improvement, and imperil its success at the time when its advantages are beginning to be realized.

Experience has shown that constant legislation is not the best mode to correct supposed errors of judgment on the part of responsible agents charged with important duties that are in a measure experimental. Enlightened public sentiment, and the good sense of the agents themselves, can be safely trusted to bring about all necessary changes and improvements where the power to do so exists.

It is a wise provision that the Commission has no power to make appointments or removals, or even to recommend persons for appointment. Any authority of that character would be fatal to its usefulness, and an unwarrantable interference with sound principles of administration. Its sole duty in its subordinate sphere is to ascertain the fitness or qualifications of applicant for the service. The appointing power of all public officers remains unimpaired, and should so remain. But the field of selection is limited to those who have been ascertained to be qualified. This rests on the solid foundation that it is conducive to the public welfare.

The Commission is of opinion that no additional legislation is demanded at present, either in the form of amendments to the existing statute, or new enactments. Any changes in the statute now would seem to be unnecessary and undesirable. The statute is sufficiently comprehensive and explicit for all practical purposes, its provisions are becoming better understood by experience, a harmonious system is being rapidly evolved, and all needed changes and improvements in methods, or adjustment of working agencies can be instantaneously made by Executive action. Further legislation, while useless for any good purpose, would add new difficulties of interpretation, and increased embarrassments to the execution of the law.

REGULATING THE EXERCISE OF POWER OF APPOINTMENT GIVEN BY
THE CONSTITUTION.

A question of much interest and importance has arisen more than once, whether in cases where the power of appointment is given to a public officer by the Constitution, the exercise of the power may be regulated by the Legislature in respect to the qualifications of the appointees.

The Commission, after careful consideration, is of opinion that this question must be answered in the affirmative.

A delegated power to appoint a public officer is an authority to select a qualified person for the position.

If the power delegated is not in terms unlimited, some limitations are necessarily implied. It does not follow that under a power vested in an officer to appoint, he may appoint himself, or some person who is physically or mentally incapable, or an alien or infant. It is implied that he shall appoint a qualified person, suitable for the position, and capable of serving the public. A naked power to appoint does not embrace as incidental to it the right to determine the qualifications of the appointee any more than it does the right to fix the compensation and to prescribe the duties.

Under a government of law with the source of power in the people, the right to regulate the exercise of power by public officers inheres in the law-making body when not expressly located elsewhere. The Constitution is the paramount law, it is true, but it is nothing more than a law emanating from the same source as statute law, only in a different manner. The Constitution does not exclude the exercise of legislative power, except when it so declares.

When the Constitution is silent the legislative power is not restrained. When the Constitution prescribes qualifications for office, or gives in terms unlimited discretion to an officer to appoint, the Legislature cannot interfere. But in cases where the Constitution neither creates the office to be filled, nor prescribes the qualifications, but simply recognizes the existence of a statutory office, and gives a naked power to another officer to fill it by appointment, the whole subject of qualifications, tenure, compensation and duties remains with the Legislature for its regulation. It has not been taken from that body. It is within the ordinary sphere of legislation. And the Legislature may act or not in its discretion given by the Constitution.

It is conceded that the power to appoint cannot be impaired by legislation, but regulation of the exercise of a power does not impair the power. It only defines the manner in which it shall be exercised. That is the function of legislation, and such details are not usually embraced in the fundamental law. The power to prescribe qualifications must reside somewhere. There is no officer above the law or independent of the law. The law-making body

instead of the will of an individual must declare what class of persons shall be deemed qualified to hold office. This leaves the power free to be exercised from the class possessing the requisite qualifications. It is conceded the Legislature might prescribe irrational qualifications having no relation to the office to be filled, such as the color of the eyes or hair, or name of the person, and such regulations might be disregarded as capricious, and a disfranchisement or denial of right secured to citizens by the Constitution.

But qualifications relating to fitness for the service, such as citizenship, age, capacity, and intelligence, concern the public welfare, and are legitimate subjects of legislative control, in the absence of express constitutional restriction.

Some views expressed by the Court of Appeals in the case of the People, *ex rel. Furman et al., vs. Clute*, 50 N. Y. 451, upon the question of legislative power, are pertinent and suggestive. In reference to statutory offices the court says: "The authority which confers a power, and may take it away may, in bestowing it, limit and restrict its exercise as it sees fit, so far as it is not specially prohibited therefrom; and may within that limit say for how long, in what manner, and upon what objects it shall be exerted. Certainly, if the Legislature may say to the voter, You shall not vote for any one for this office, but it shall be appointive; it may say, You shall not vote for any one for this office who is not free from this disqualification which we now declare. . . . The Legislature may not put upon any elector a personal restriction from voting for any officer who may be elective, or whom it may declare elective, save such restriction as is imposed by the Constitution, for from that it is especially prohibited. *But it may, in the exercise of its judgment, for the public good, limit the number from whom the elector may select, for thus to legislate is within the general and sovereign power of legislation which it constitutionally possesses.*"

If the constitutional right of an elector in the use of the ballot may be limited in respect to the number from whom his selection for public office may be made, it is no less clear that for the same high purpose, the public good, the number from whom appointments may be made may also be limited. The power to appoint is not more sacred or important than the right to vote. Both are protected by the Constitution, but if the right to vote can be regulated by the general and sovereign power of legislation, the right to appoint, which is certainly no higher, must be subject to the same control.

The case of *Menges vs. The City of Albany*, 56 N. Y. 374, has reference only to the exercise of judicial power by the courts for judicial purposes, and does not relate to selections for public office in respect to which the public welfare is concerned. This case does not, therefore, impair the doctrine enunciated in the case of *Clute*.

OPINIONS OF THE ATTORNEY-GENERAL.

The Attorney-General has been asked a few times for advice, and has furnished three official opinions on questions of public interest.

One of these relates to the right of women to compete in the examinations, and for official appointments; another to the location in the public service of the employes of Excise Boards; and the third to the powers and duties of Mayors in respect to municipal regulations. These opinions appear in the Appendix.

POLITICAL ASSESSMENTS.

One of the incidental objects contemplated by Civil Service reform from the outset has been the abolition of the abuse of political assessments upon public officials.

This abuse had reached such scandalous proportions that the public treasury was considered a source from which partisan committees might replenish their campaign revenues, and leading men boldly maintained the proposition that there was an implied contract on the part of a man accepting a public appointment to contribute a percentage of his salary to the uses of the party under which he held office. This conception that public offices belong to party, to be utilized for partisan ends, instead of being trusts for the public welfare, is the vital error of the spoils system.

From this mistake have sprung the abuses in practice that have demoralized political parties, and often brought discredit on public administration, and which have made the demand for reform so urgent and widespread.

The statute contains a provision (section 11) intended to correct this evil, and to protect public officials from being the prey and the instruments of partisan managers. And the same spirit pervades all the rules, regulations, and methods brought into existence under the statute.

The Commission has made inquiry to ascertain to what extent there has been an abatement of the practice of political assessments, and is gratified to report that the information received indicates that the evil has very greatly declined, and that public servants feel a degree of independence of partisan oppression, and a security founded on character and efficiency that have not been felt before in a generation.

EXTENSION OF THE SYSTEM TO OTHER STATES.

Since the last report a Civil Service Act has been passed by the Legislature of Massachusetts, which in its general features is based upon our State law. It applies to the service of the State and of all of its cities, twenty-four in number. The application of the new system to the service of the cities as well as to that of the State is under the sole direction of the Civil Service Commission, a provision that secures not only uniformity of procedure, but also great economies in the administration of the law.

A highly competent Commission has been appointed by the Governor and Council, and the rules prepared by this Commission have been recently promulgated. They closely follow the rules for this State, but in addition to the regulation of the permanent service, they provide for the registration of persons desiring employment as laborers by the city of Boston, and for their selection from the register without reference to partisan considerations.

A Civil Service bill has been recently introduced in the Legislature of Indiana, and similar bills have been prepared for introduction into the Legislatures of Illinois and Maryland, when they convene.

Governor Pattison, of Pennsylvania, in his recent annual message, urges the preparation and passage of such a law. There may have been similar movements in other States that have escaped our observation, but the general and growing interest in the regulation and improvement of the public service is evinced in the action taken in the important States above named.

REVIEW OF THE WORK.

Recalling the fact that two years have not elapsed since the passage of the "Act to regulate and improve the Civil Service of the State of New York," May 4, 1883, the Commission feel at liberty to express their satisfaction at what has been thus far accomplished since their appointment. No violation of the eleventh section of the amended Act touching political assessments has been brought to the knowledge of the Commission.

The classification of the Service of the State, a task of no slight difficulty, the preparation of the rules and partial appointment of State Examiners, after conferring with the heads of departments and Institutions, stated in its first report, have been supplemented during the past year, under the Amendatory Acts, by important and substantial progress; the improvement of the classification of the State Service with the preference given by law to honorably discharged Union soldiers and sailors, the increase of positions in the competitive list, the practical inauguration of competitive and other examinations under unexceptionable Boards of Examiners, the approval by this Commission of the elaborate regulations prepared by experts for the cities of Brooklyn and New York, including those for the Firemen and Police, and the approval of regulations similarly in harmony with those of the State, for the cities of Rochester, Auburn, Yonkers, Long Island, Poughkeepsie, Utica, Binghamton, Cohoes, Ogdensburg, Kingston, Albany, Troy, and Elmira.

The enlargement of the sphere of Civil Service methods, and the rapid progress in extending the competitive schedules, seems to have been due to the growing conviction among the people that in public as in private life competition is the true test of merit, that the right to compete is a natural right of each citizen, a right to which the State by its popular education contributes large advantages. At the same time our people recognize the fact that in the

public business, in the benefits and expense of which they are alike interested, the State is entitled to the highest merit attainable under impartial rules.

Substantial progress has also been made in the practical use of the methods adopted by numerous examinations for a variety of positions, in all departments of the service, followed by appointments in accordance with the rules from the persons examined.

There may also be remarked the largely increased interest in the subject on the part of the people at large, and among the officials in the public service, the diffusion of a better knowledge of the principles, and the nearly universal acceptance of the truism that public trusts are not legitimate subjects of patronage, but like positions in any other well-ordered business, should be held by those who can best administer them for the public welfare, and that a properly regulated Civil Service is the best agency yet devised for bringing the administration of public affairs to business principles.

The Commission believes that the preliminary work of organization and preparation for the application of Civil Service methods in the State at large, and in the cities, a task both difficult and embarrassing, has been brought to the point where its usefulness can be tested.

The great diversity in the character of the State service, and also in the municipal service, the vast number of persons employed, the variety in the kind and degree of qualifications required for different positions, have rendered the duty of proper classification, of distribution under appropriate schedules, and of methods of examination and selection of Boards of Examiners, a work of serious delicacy and responsibility, in which the excellent antecedent work under the National Act afforded little assistance, on account of the restricted sphere of application of the national rules.

The Civil Service Statute and the rules and organization to apply its methods became operative when all, or nearly all, positions in the State, and in the cities, were occupied by incumbents previously selected. The methods have no application to those incumbents, except for promotion.

These methods can, therefore, only be applied to new appointments as positions become vacant by death, resignation, or removal. These processes are proverbially slow, except the latter, which has been biennially rapid in the past.

The fruits of Civil Service methods will, therefore, only become gradually apparent, but of its beneficial results there can be no doubt. There can be no mistake in the fundamental principle that has for its object the selection of the best and most competent men for the public service, and the corollary from that principle is unquestionable, that the selection of public servants for the subordinate positions should not be abandoned to the unrestrained will of the head of an office, and the machinations of partisan committees, but should be made by disinterested and competent men, under fixed and impartial rules guaranteeing fair play to merit.

Higher grade employes, better service, reduction in the number employed, and large economy in expenditure, are among the prominent results already partially realized, to become obvious in due time. The relief of public officials from importunities for place, and protection of employes from political assessments, are accomplished facts.

Meanwhile a reasonable degree of patience on the part of the public, and intelligent support by the Legislature, full and honest criticism by the press, and the prompt correction of any discovered errors by those intrusted with the practical duties of the reform, and absolute good faith in its application, will certainly and in the natural evolution of results bring the system theoretically and practically to the complete and efficient agency for good expected from it by the friends of good government.

This report would be incomplete if the Commission should fail to refer to the relation of your Excellency's predecessor, Governor Cleveland, to Civil Service reform in this State. As the official head of the system under the law, he has done more than merely to give perfunctory executive assent. His official action and the weight of his influence have alike been affirmatively exerted to promote the reform. The Commission has received from him at all times most courteous consideration, and in its efforts to apply and enforce the law has been sustained by his cordial support from the time of its appointment to the close of his administration. It is only justice to the retiring Governor to say that the successful establishment of Civil Service methods in the State of New York during his administration, and the acceptance of the reform by the public, are largely due to his intelligent interest in the subject, his fidelity to its principles, and his prompt and courageous action through all the stages of its progress.

In its last annual report the Commission referred to the value of the services of the Chief Examiner, and to his diligent and discreet performance of official duty.

It is only just again to commend his conscientious and very efficient work, and to make mention of the great assistance he has rendered the Commission, and the reform in which it is engaged.

All which is respectfully submitted.

JOHN JAY,
AUGUSTUS SCHOONMAKER,
HENRY A. RICHMOND.

APPENDIX A.

CHIEF EXAMINER'S REPORT.

STATE OF NEW YORK,
OFFICE OF CIVIL SERVICE COMMISSION, NEW YORK. }

HON. JOHN JAY, *President New York Civil Service Commission,*
Albany, N. Y.:

SIR — I have the honor to submit the following report in regard to the examinations held during the past year and also in regard to such other duties as during that time have been devolved upon me by the Commission.

COMPETITIVE EXAMINATIONS.

The first competitive examinations under the rules were begun at Albany on January 24, 1884. They were five in number and respectively for the positions of first, second and third grade clerks, messengers, orderlies and prison guards. Although ample notice of these examinations was given by advertisement in all the Albany journals, only forty competitors presented themselves. The greater number of these were persons who had applied for positions in the State departments, in the belief that all the heads thereof who took office on the first day of January would make their appointments before the rules went into effect upon the fourth day of that month. In some cases the original applications of these aspirants were turned over to this Commission, so that probably not more than one-quarter of the competitors at this examination were original applicants under the rules. This paucity of applications seems at first sight inexplicable, but it has been experienced in the early stages of the merit system of appointment wherever it has been established.

It was so in Great Britain, in the Customs service at New York and under the United States rules of 1872 and 1883.

This early reluctance to enter for competition originates in the general ignorance of the methods, combined with a lack of faith in their sincerity of purpose and fairness in their execution. I have heard at various times many expressions of this incredulity, which is not attributable to any lack in the system, but to the long existence of patronage as the only means of replenishing the public service. Personal importunity and selfishness and party influence and sub-

servience had been for so long a time the potent, indeed the sole factors in appointments, that the people were educated to the belief that their only chances to enter their own service were by a concentration of these ignoble forces upon the appointing power. This low view of the public service had so long obtained that comparatively few could believe that any change for the better had been accomplished. It has been found, however, that each successive competition attracts a larger number of applicants and the process of popular education on this point will gradually extend until the whole people will recognize the restoration of their equal rights to public employment.

Although there were some fairly competent candidates in these first examinations there was not such a general competition as the Commission had desired. Nearly all these first candidates resided at Albany or its vicinity and the remainder of the State had no representation. Preparations were accordingly made for a series of examinations in April, and simultaneously at Brooklyn, New York, Kingston, Albany, Plattsburgh, Utica, Watertown, Syracuse, Rochester, Buffalo, Elmira and Ithaca. It was thought that this arrangement would accommodate all parts of the State, so that competitors from every locality could attend the examinations without great expense. The main objection to examinations for the same grade being held at several places is the difficulty of obtaining a uniform grading of the competitors by the distinct boards of examiners. This difficulty was surmounted by having the general board of examiners prepare all the questions which were the same for all the places. At each of these there were appointed as representatives of the Commission, two citizens of such prominence and high character as would be to all concerned a guaranty that impartiality and fairness would govern all the proceedings. The representatives had charge of all local preparations, received the competitors and distributed the questions, made all necessary explanations and settled all questions and disputes.

The papers of questions with full instructions for the guidance of the representatives were sent to them in sealed parcels so as to be received the day before the examinations began, which was set for April 24. Immediately after the examinations ended, the representatives returned to the Commission under seal all the papers which were submitted to the general board of examiners for marking and the grading of the competitors. A uniform standard of gradation was thus insured while the labor of marking and grading was reduced to a minimum. This plan of procedure was in all respects satisfactory, and should be followed in all general examinations held hereafter. Although none of the gentlemen who acted as representatives had had any experience in such examinations not an error or delay occurred in any of their proceedings.

At these examinations one hundred and fifty-four candidates appeared, all of whom completed the tests, except three, who with-

drew before the close. From the results of these examinations, ample eligible lists were prepared for filling vacancies in all the grades concerned.

There had been previously held on February 23, a series of examinations at Albany for the positions of messenger, orderly and prison guard, which were attended by forty-seven competitors.

The most interesting competitive examinations, as dealing with professional qualifications, were those to fill vacancies in the Hudson River State Hospital for the Insane.

The trustees of that institution in the exercise of their discretion under the twenty-first rule, offered for open competition the positions of first and third assistant physician at annual salaries respectively of three thousand and one thousand dollars, with maintenance in both cases.

The first of these positions is in function and in compensation the highest yet presented for competition in this country. With a view to the attraction of those best fitted to serve the State in these important places, the Commission removed the restrictions as to residence and citizenship imposed by the twenty-fifth rule.

The examining board comprised eight physicians and one professor as follows:

Dr. Stephen Smith, chairman.

Prof. Henry Drisler, examiner in general education.

Dr. James S. Leaming and Dr. Darwin E. Hudson, examiners in general medicine.

Dr. Allen McL. Hamilton, examiner in the anatomy, physiology and pathology of the nervous system.

Dr. Theo. H. Kellogg, examiner in insanity.

Dr. A. Nelson Bell, examiner in preventive medicine.

Dr. Lewis Balch, examiner in surgery.

Dr. A. E. Macdonald, examiner in administrative qualities.

Out of sixteen applicants, thirteen presented themselves for the examination, which was held at the Academy of Medicine in New York on the 22d, 23d and 24th days of October.

On the afternoon of the last day, the candidates were examined at the Ward's Island Insane Asylum by Dr. Macdonald. Each candidate was taken separately into one of the asylum wards and required to examine a patient, make a diagnosis of his case, draw up a legal commitment of a lunatic, and to prescribe and perform other clinical duties. As may be deduced from the high professional standing of the several examiners, the examination on each subject was thorough. A stated limit of time was given for answers on each question, the questions being printed, and all answers except some at Ward's Island, being in writing. Two of the candidates withdrew from the competition on the first day.

The relative weights given to the several subjects were adjusted as follows for the principal position :

1. General education.....	4
2. General medicine	4
3. Anatomy, physiology and pathology of nervous system.....	4
4. Insanity	5
5. Preventive medicine.....	2
6. Surgery.....	2
7. Administrative qualities.....	4
Total.....	<u>25</u>

The two candidates for this position standing above the minimum were marked 82.20 and 71.56, and the higher one received the appointment subject to the usual term of probation, and entered upon his duties about the middle of November. There was only one successful candidate for the lower position, and he has been recently appointed on probation.

These examinations attracted the general attention of the medical profession. Their absolute success will depend upon the further test of practical fitness as evinced during the probationary period.

NON-COMPETITIVE EXAMINATIONS.

Sixty-one of these for positions in Schedule C have been held to date, a larger part of them for positions in the department of the State Engineer. These latter have been made as practical as possible, as will be evident by the two following schemes.

FOR ADDITIONAL ASSISTANT ENGINEER ON CANALS.

1. Arithmetic. 2. Geometry. 3. Applied or practical geometry.
4. Plane trigonometry. 5. Mensuration. 6. Use of instruments.
7. Mechanics. 8. Practical construction.

FOR ADDITIONAL LEVELMAN ON CANALS.

1. Arithmetic, including evolution. 2. Plane trigonometry. 3. Mensuration. 4. Use and adjustment of instrument. 5. Tabulation of field-notes. 6. Making profile draughts.

For rodmen, the subjects were more simple, and for an engineer on the "Hudson River Improvement" work, the examination was largely in hydrographic surveying.

The experience in these examinations led me to suggest to State Engineer Sweet, that the positions of assistant engineer, levelman and rodman be transferred to Schedule B, all examinations thereafter being competitive. In this opinion Mr. Sweet heartily acquiesced, and the positions named have recently been placed in Schedule B, by resolution of the Commission.

In an examination for the position of female assistant physician at the Willard Asylum for the Chronic Insane, in addition to ques-

tions in general education and general medicine there were propounded some on gynæcology prepared by Dr. Mary Putnam Jacobi, of New York city. The subjects in an examination for matron of the same asylum were almost exclusively those touching the practical duties of the position.

Up to December the 15th, there had been admitted to employment in the State asylums for the insane, three hundred and sixty-five persons who had passed an examination as provided by the twenty-eighth and twenty-ninth rules for positions in Schedule D. It is the unanimous opinion of the asylum superintendents that these examinations have been productive of great benefit to the service. This class of employes embraces the attendants and nurses, who have the direct personal charge of the insane and discharge duties important, delicate, exacting and often repulsive or dangerous, at a rate of wages no higher than that paid for ordinary domestic service. The obvious difficulties in procuring and retaining fit persons in these places were considered by some to be a reason why the additional impediment of a formal examination would be inadvisable. This fear has been dissipated by the results, since no additional embarrassments have been encountered in securing applicants. In addition to furnishing satisfactory vouchers as to character, habits and temper, the applicants are examined in reading, writing and the four fundamental processes in arithmetic. Complete records of all vouchers and tests are kept, to which were added in case of those admitted, the subsequent promotions or other changes in position and the causes for dismissal. This uniform plan at all the asylums secures a full record of the service, and by insuring under the law all possible safeguards as to the character, temperament and capacity of this important class of employes, it is a protection to the superintendents in the discharge of their official trusts. Another important point that has been developed is the subjective influence of the examination upon the employes themselves. It has impressed them with a sense of the gravity of their duties, and encouraged an *esprit du corps* that has increased their usefulness.

In spite of their low compensation, they feel that their function is not domestic, but official, and with a recognition of their responsibilities as functionaries they are more amenable to discipline. In some of the asylums the attendants selected under the rules are regularly instructed in training schools for nurses, and have responded with intelligence and ambition to these means of improvement.

This education of trained nurses for the insane possesses a public interest that extends beyond the asylum walls, and tends to supply a want long deplored by those so unfortunate as to need such service for demented ones near and dear to them.

Similar plans of examination are in preparation for the asylums for idiots and the blind, and for the House of Refuge, where similar good results may be expected.

In regard to the efficacy of Civil Service methods as applied to the positions in Schedule D, there have been some doubts expressed in institutions where the rules have not yet been fully put in operation. The employing officer is apt to believe that no Board could make a better selection than he could when uncontrolled; but the experience in the asylums indicates advantages other than those touching capacity merely, and which are of inestimable value in securing the object of the law "to regulate and improve the Civil Service."

There are now being prepared schemes of examination for the clerks, attendants, etc., in the courts of New York and Kings county, covering nearly three hundred and fifty positions; for the employes of the New York Excise Commissioners, numbering about fifty, and for over one thousand health officers distributed through the entire State. This addition of over fourteen hundred positions to the classified Civil Service has been made under the decisions of the courts, not known to the Commission when the rules were promulgated, but these had been prepared with such comprehensive consideration as to require no amendment to meet this great and unexpected expansion of the classified service.

The scheme for the examination for the court clerks will be based upon that prepared for other clerks in the service (see Rules, etc., pages 47 and 48), to which will be added such legal subjects as may be pertinent to the duties of special clerkships. Stenographers, in addition to examination in general intelligence, will be required to take short-hand notes of discourses, and instantly read them promptly and correctly, and also to take notes of matter read to them, and to accurately transcribe the same in long-hand. Interpreters, in addition to possession of general education, will be required to speak fluently and write correctly two languages besides the English, and be conversant with the geography and history of the countries whose language they speak. Attendants will be subject to the examination prescribed for messengers, etc. (See Rules, etc., page 48.)

No scheme for the examination of the excise inspectors in New York has yet been completed.

The peculiar nature of their functions and the temptations to which they are exposed make the examination as to character and habits the prime factor in the selection of these officials. It was stated by the president of the Excise Board that the average official term of these inspectors is only six months, so frail were they in resisting their opportunities for excessive drinking and other vicious indulgences.

The careful consideration given to this subject will, it is hoped, evolve some plan whereby a more sturdy and self-denying class of appointees may be secured for these dangerously seductive places.

The State Board of Health, through its president and secretary, has urged upon the Commission the framing of such a practical examination as would insure for the positions of health officers the

"competent physicians" that the statute enjoins for the discharge of such vital duties. The qualifying term "competent," as used in the statute, must be construed in the light of their duties as referring to competency in matters of sanitation and hygiene. It is conceded by the medical authorities that a physician may be fairly expert in the diagnosis and cure of diseases and not be versed in the laws and precautions that govern the prevention of diseases, or that arrest their spread or dissemination. It is further admitted that generally the medical colleges have hitherto neglected this branch of medical science, and that the mere possession of a diploma does not imply proficiency in sanitary knowledge. While, therefore, a special examination will alone test such proficiency, a consideration of the above defects will govern for the present the standards of qualifications to be determined for these positions, and the examinations will be necessarily elementary in many cases; but the very inclusion of the health officers in the classified Civil Service, subject to the rules, will attract public attention and professional solicitude to their grave functions and the necessity of proper preparation for them. The interest thus excited must stimulate education in sanitary or preventive medicine among both undergraduates and practitioners.

The whole subject assumes at this time a more than ordinary importance, since the probable approach of the cholera makes the neglect of any precautionary measure a public crime.

So far as the work of the Commission is concerned the practical difficulty arises from the dispersion of this class of officers throughout the entire State, and the low compensation allowed them, which would not justify their examination at any distance from their residences. This has been practically met by providing that the examinations shall be held by the judge of each county; but the low rate of compensation, coupled with the liability to examination, may deter the acceptance of these positions in some instances, though I cannot but believe that this reluctance will be surmounted by that professional beneficence and devotion to duty characteristic of medical men as a body. Hesitancy to encounter an examination usually vanishes also with the novelty of the idea.

It may be that experience will improve or modify the plans for these examinations as at first established, but in the meantime there appears an excellent opportunity to improve the present service.

At the Elmira Reformatory there has been encountered some trouble in securing competitors for the position of guard. These officers have an exacting and tedious duty, with few privileges, and receive only \$30 per month with board. This is not very attractive to competent persons, particularly in the months when there is an active demand for farm and other labor. The Commission has recently, by resolution, removed the restrictions imposed by the thirty-fifth rule, so that applications may be received from residents in the adjoining parts of Pennsylvania. But an efficient

and stable service can be secured only by an increase of pay to these guards, as also to the overseers who receive only \$40 a month and board for very responsible duties.

Certain contracts for prison labor having expired or been abandoned in two of the prisons the Superintendent of State Prisons has felt constrained to employ, on State account, the convicts thus released from work. As it became necessary for this reason to provisionally employ overseers, instructors and skilled tradesmen to supervise and supplement the labor of these convicts, the Superintendent requested the Commission to provide for the examination of this additional force. For this purpose the Commission has appointed boards of examiners for Auburn and Clinton prisons and eleven persons have been examined by them to this date.

RELATIVE VALUE OF COMPETITIVE AND NON-COMPETITIVE EXAMINATIONS

The Civil Service statutes enjoin selections for the service by open competition except "when competition may be found impracticable." The Commission in the preparation of the rules recognized certain existing conditions as not favorable to an immediate resort to competition in all grades of the service. Before such a comprehensive measure could be safely adopted, both the people and the great body of their official servants had to be educated in both the principles and methods of the system. There also existed the difficulty, indeed the impossibility, of immediately procuring capable and trained examiners, and there was also required a certain time to organize the machinery for carrying into execution such a broad and thorough plan.

The Commission did not, however, abandon its purpose to extend competition to the farthest possible limit.

Several months before the rules for the State service were completed, I prepared at the request of Mayor Low, and with the permission of the Commission, a body of regulations for the service of the city of Brooklyn, and in comments on and explanation of the same contained in my communication to the Mayor of June 28, 1883, in reference to Schedule C, wherein appointing officers could at discretion select competitive or non-competitive examinations, I said: "It should be borne in mind that qualifying examinations and limited competition are simply temporary expedients to be adopted, pending systematic arrangements to extend open competitive examinations as the sole means of access to the service in every capacity except elective positions, or those where the appointment is specially vested by law in the chief officer of the State or city."

"The radical objection to qualifying examinations or limited competition is that they are simply modifications of patronage and therefore incurably defective, while they also deprive the service of the largest area of selection and exclude from it all those who have no influence. In practice the pass examination has hitherto degenerated into a perfunctory compliance, by which the examiners re-

flected the will of the appointing power. An independent board might for a while successfully resist such a tendency, but the concentration of influences adverse to the public interests would be encouraged by the opportunity and tend to embarrass the examiners in the discharge of their duties. It may be safely assumed that so long as there remains in the business administration of Nation, State or municipality, the slightest taint of patronage, there is danger of relapse into that deplorable condition from which every patriotic citizen desires to rescue the public service. The provisional system of merely qualifying or limited examinations should, therefore, be gradually abandoned as the means for holding competitive examinations expand until admission to the entire service is free to all citizens upon equal terms, demanding fitness as the sole test in consonance with the fundamental principles of our government."

The plan prepared as above mentioned was adopted almost without change by Mayor Low, and one very similar prepared for Mayor Edson was soon after adopted for the service of the city of New York, so far as the law then authorized.

Subsequently when the State rules were being prepared, the Commission made similar schedules and included in the open competitive schedule the great mass of clerkships and similar positions, and those of orderly, messenger, prison guard, and teacher in the charitable and corrective institutions. All of these could be easily managed through concentration of their numbers at a few points and by the experience as to similar examinations in the customs service.

The Commission's first report said "there were other subdivisions to which the principle of open competition might be thought applicable, but in each case there were reasons to the contrary which seemed to have sufficient cogency to induce further consideration. These reasons generally arose from the special or expert qualifications required for the duties of the several positions, and it seemed desirable to delay the application of open competition to these as also to the lower ranks of the service until further experience had been gained." The Commission has considered it the best policy to make the application of the system progressive as the means of administering it were perfected.

In the mean time the very capable board of municipal examiners in Brooklyn has gained an experience and confidence that led to the extension of competition to the selection of foremen and inspectors in the Department of Public Works, thus fully supporting the views expressed in the original plan submitted to Mayor Low. The work accomplished by the Brooklyn Examining Board, not only in the extension of competitive tests, but also in the critical study of the public service and its needs, form an important chapter in the history of the great movement to improve that service.

Mr. Edward M. Shepard, chairman of that board, read before the American Social Science Association at Saratoga, in September last, a paper on "the extension of reform methods to the Civil Service of

States and cities," which in research, analysis of defects in past methods of appointment and of the practical remedies, both in principle and detail, is an important contribution to the literature of political reform. Mr. Shepard answers forcibly and conclusively the main objections advanced by those who oppose the new methods of appointment or doubt their efficacy.

The results of the experience gained both in Brooklyn and New York have been practically expressed in the regulations recently prescribed by the Mayors of those cities, under the amendment to the statute. These regulations subject to open competition nearly the whole service of the respective cities, as is shown by the statistical tables accompanying the papers appended to your report.

The solution of the problem as applied to the State service has not been so easy. The dispersion of the service over a large area, with concentration of any considerable numbers at a few points only, renders difficult the preparation of eligible lists that will serve for all localities.

An applicant for position of prison guard may, for domestic reasons, desire a place at one of the prisons only where a vacancy may not occur for a long while, and this question of locality affects the disposition of applicants throughout the entire service, and is an embarrassment not encountered in the cities. As the number of experienced boards of examiners is increased throughout the State, there will be larger facilities for meeting the special requirements by an increase in the number of eligible lists. The Commission has added to the competitive schedule one hundred positions within the past two months, and has had under consideration a further increase.

There has been a tendency to question the practicability of extending competition to positions where the duties are professional or technical, upon the presumption that these demand qualifications not readily tested by an examination under the rules. Such, however, is not the opinion of State Engineer Sweet who, as before stated, has acquiesced in competitive examination of candidates for place in his department. Even where the positions are those requiring skill in handicrafts or what are known as the "trades," an examination may be so framed as to measure the relative skill of competitors. On this point I would quote at length the opinion of the British Civil Service Commissioners in their seventeenth report. (1872.)

"There is one class of competitions to which we desire to draw particular attention; and we do so the more readily, because their success has been most satisfactory, though they have reference to situations to which, it is sometimes asserted, the principle of competition cannot properly be applied. In several of the departments there exist situations of a technical or professional character, for which the scientific or theoretical knowledge that can best be tested by examination is less essential than practical experience connected

with the art or profession in question. In these cases, if any method of personal selection or nomination might appear at sight to have an advantage over any form of open competition.

"But it is obvious that under the former system, however scientifically administered, it must be a matter of accident whether the best qualified person comes within the view of the individual with whom the selection rests; whereas by inviting public competition candidates can be brought forward whose merits could not otherwise become known. On the other hand, it is as easy under a system of competition as any other to secure that the person appointed shall possess the requisite practical experience, by making it a condition of the competition that no one shall be eligible who cannot furnish proof of having gone through a personal or technical training of a certain kind, and for a certain period."

"Accordingly the method of selection by public competition among experts has been adopted in a variety of cases with success, though some of them were such as to try somewhat severely the soundness of the principle."

The Commissioners then give the details of one of these cases, where the candidates were required to be practically competent to superintend the supply and repair of all articles of furniture, fittings, etc., for the public buildings and royal palaces, and from thirty-seven applicants there were selected two, who in a short service "proved in every respect admirably qualified for the peculiar and difficult duties which they have to discharge."

The general views expressed above were reiterated by the Commissioners in a letter to the Treasury on June 24, 1879, and have been practically enforced in the extension of competitive tests.*

* Among the positions now filled by open competition are the following requiring expert qualifications: Architectural and Engineering Draughtsmen; Assistant in Greenwich Observatory and Cape of Good Hope Observatory; Assistant at Greenwich for photographic and spectroscopic observations; Assistants in the Nautical Almanac office, and in the British Museum; County Surveyors; Consular Interpreters; Practical Mechanician in the Stamping office; Relief Engraver in the Mint; Superintendent of Works at Kingston Harbor; Graphists; Assistant Engineer of Public Works; Assistant Curator in the Museum of Practical Geology; Assistants and Keepers in the South Kensington Museum, both in the science and art branches; Assistant Naturalist; Assistant Librarian at the Royal School of Mines; Examiners of paper and binding in stationery; Chemist in War Department; Examiners for office of Works; Assistants at the Kew Herbarium; and for promotion in the Naval Dockyards, the leading trades in every branch of trade, as painters, riggers, rope-makers, etc., being their trades in all.

SOME PLAUSIBLE OBJECTIONS TO COMPETITION.

The opponents of open competition as a means of selection for the Civil Service have, from time to time, advanced certain objections to it, which though in great part specious and sophistical, have by dint of repetition gained some credence. Although the subject is in these respects trite and nothing new may be advanced in dissipating these fallacies, I trust the Commission will not consider it inopportune if I here reiterate the confutation of the more ordinary objections.

In the early stages of the movement for reform the point generally made was that no new remedy was needed, since even if it were admitted that there were evils in the public service, these could be readily cured by appointing none but capable and honest men. This proposition is irrefutable since no one has ever affirmed that dishonest or incapable men should be appointed, and yet very grave abuses have long been rife in the Civil Service. As in so many other matters, universal acquiescence in incontestible principles is not all-sufficient; there must be both safeguards and penalties. Even if the official be immaculate we exact from him official oaths and bonds and hold him to rigid accountability for his official trusts. Long experience has shown that officials do not invariably appoint capable and honest subordinates, and the causes of this are such as cannot be reached by mere injunctions. The hostile critics of competition, when they concede the existing abuses in the unrestrained exercise of the power of appointment, proposes as a sufficient remedy the "pass" examination which is a qualified exercise of patronage and has absolutely failed as a remedy wherever tried.

It retains all the odious features of the unmitigated "spoils" system and particularly its anti-democratic features whereby the service of the country is monopolized by a privileged class. But at the very worst, why resort, say these critics, to the competitive system which is unnatural, unbusiness-like, scholastic, revolutionary, impracticable, etc., etc.

The functions of non-political civil servants, who compose about nine per cent of the administrative service, are simply of a business nature, and have no more to do with their political or religious sentiments than if they were employed by private parties. It is, therefore, plainly only a question of fitness for the business duties of the several positions that is to be considered, and there is a single instrumentality that always shapes that consideration and the final selection of the person to be appointed.

Granting that an officer is unrestrained by law or rule in making selections for places under him, and no matter what may be his motive in the selection, it is imperatively governed by the principle of competition. This holds good as to the filling of hundreds of thou-

sands of such places, National, State, or municipal. Whether the selection is made on account of personal relations, command of influence, partisan activity, powers of importunity or inherent fitness for the duties, the individual appointee obtains his place because in the estimation of the appointing officer he stands highest in the peculiar quality that urges the appointment. It is a plain, downright, unequivocal competition, but one that is not permanently recorded, because in most cases the qualification that governs the selection is not one the appointing officer would be willing to avow.

But such an important exercise of official power as that of appointment should be as much a matter of record as the vouchers for the disbursement of public moneys. A citizen may expend his own funds or employ his own servants, without accounting to anybody for his action, but the official is executing a trust for the people and should by his records, open to all, be able to prove his fidelity to his employers in all his official acts. It is strange that the most violent opposition to fixed rules for the employment of public servants comes from those who profess the greatest anxiety to enforce a rigid accountability. Now of all the motives that might govern an official in the selection of his subordinates, that of obtaining the fittest person is the only one he would be willing to record, because it is the only one he should consider.

How shall the fittest man who is willing to serve be obtained? Shall this important field of inquiry be confined to the acquaintance-ship of the chief official and that of his friends? And within any field of selection, narrow or broad, how is the superiority of the fittest man to be determined so that it may be of record officially? There is but one solution of these queries and it is that the open competition gives the broadest scope of choice, determines with substantial accuracy the relative fitness of all who apply, and puts on record all the transactions with their details.

In the nature of things there must be competition and it is the sole purpose of Civil Service laws, rules and commissions to regulate the competition so as to secure the best service for the people. Such a regulated competition, open on equal terms to every citizen and with its findings formally recorded, is the only method of appointment that absolutely precludes the exercise of patronage, that exclusive and baneful privilege so odious and foreign to every principle of a democratic government.

The oft-repeated argument that the method is not business-like, since private employers do not have recourse to it, is fallacious, because such employers do adopt it without record of the details. Every private business concern chooses for its service the fittest subalterns it can obtain, and the natural law of self-interest compels this rule, so that wherever it is departed from, it is because the action of the interest is weakened by the complicated agencies required in great corporations, widely separating the employe from the employer; and to the extent of this separation there are possibilities of mal-administration. The oft-repeated maxim that the

public service should be conducted on business principles means that accuracy, promptitude, honesty, economy and efficiency are as essential in public as in private affairs, but the methods of securing these qualities cannot be exactly the same. The merchant has a direct personal and pecuniary interest in his private affairs which leads him to make a careful selection of his employes, but in the public service, there must be substituted some more complicated agency in the form of laws, regulations, reports and inspections. In the selection of subordinates the great and universal law of competitive examination obtains in both the private and public business, but in the latter there must be formalities that are substituted for pecuniary interests, in order that the great business principles above named may be applied in the highest degrees.

Some advance the query, how can competition measure honesty and fidelity or test moral qualities? These are indispensable qualifications in any public position, but their attainment cannot be secured by one method more than another.

An officer with unrestrained power to appoint has to depend upon the testimonials of others as to the moral integrity and discretion of those whom he appoints. It is quite as easy to obtain trustworthy testimonials by a special board and according to fixed rules and to have such vouchers scrutinized and verified by skilled examiners. But no system of selection can infallibly test moral character nor insure it in those selected; for these dependence must rest upon the ordinary motives that sway mankind, the innate moral principle, more or less fortified by education, the fear of punishment or disgrace, the honor and self-respect of the employes; all these are guarantees against indiscretion and dishonesty which no particular method of selection can re-enforce.

A fear is now and then expressed that the selection of subordinates in the public service by competitive methods will establish a "privileged class." The absurdity of such an apprehension is obvious and ridiculous. An aristocracy of comparatively few clerks, messengers, prison guards, policemen, etc., with moderate salaries and removal at any time by their superiors, would not be very dangerous to the body politic. The man so unambitious as to crave the narrow career of a government employe would not probably put on the style and airs of a nabob or patrician or become a conspirator against the common weal. This fear that an aristocracy will be founded by these official tenants at will is expressed generally by those who favor a privileged class of partisan mercenaries intent on "stratagems and spoils," or an aristocracy of political bosses, who shall dispense as their rightful patronage the minor offices constituted for the exclusive service of the people. The partisan janizaries and centuries intrenched in the public offices form the privileged class that is to be feared. But the *reductio ad absurdum* is the apprehension that an aristocracy will be engendered by a method of selection that is of the very essence of an enlightened democracy. Competition

open to every qualified citizen upon equal terms, without regard to race, religion, or political opinions, places the access to the civil service upon a basis as purely democratic as is the election of officers by popular suffrage. It is this feature that must commend the competitive system to every patriotic citizen, who believes in those principles of popular rights and equality that lie at the very foundation of all our political institutions. The son of the poorest and most obscure citizen can compete for a clerkship on equal terms with the son of the richest or most illustrious, and in the contest, wealth, influence and importunity count for nothing; a contest where to the victor belongs the reward of superior merit, a principle incomparably higher than one so often quoted "to the victor belong the spoils." If there were no other valid argument, the friends of the competitive or merit system could stand upon its democratic aspects, its enforcement of equal rights and "fair play."

In connection with the "privileged class" argument is the assertion that under the merit system the official will be indifferent, insubordinate, discourteous and insolent to the public transacting business with them. This assertion does not take into account that integral part of the merit system which disavows any absolute tenure, but leaves the power of summary dismissal without restraint. This provision gives the best possible security for good discipline and insures the service against the continuance of that arrogance and impertinence exhibited to the public by appointees who were so secure through their personal and partisan influences that no superior dared to remove them. The clerk in a public office who could rely upon his strong "backing" could indulge in almost any conduct not felonious and feel certain that the severest penalty for it would be an admonition; the power that procured his appointment could compel his retention. In the merit system the official incumbent must depend upon his own good conduct and efficiency, since no extraneous influence got him his place or can insure his continuance. In fact the only effectual means of enforcing official discipline is to give the head of the office the summary power of removal and at the same time protection from the duress and potency of outside influences such as are wielded under the patronage system.

To some of those who have overlooked the points above given, the fixed tenure in office with removal for proven cause only has occurred as the proper remedy for abuses in the civil service; this, it has been well said, is putting the guard at the back door and not the front one.

It means that no particular care is to be taken in the selection of officials, but when selected they are to be dismissed only by a judicial process, which in the municipal government of New York has practically failed to insure justice to the public interests. There can be misdemeanors and impertinences difficult to judicially prove, and a shrewd employe may keep within the very verge of such proof. The abolition of patronage accomplished by open competition

destroys the general motive for illegitimate removals, *i. e.*, to find a place for some favored one. It has been happily proposed to substitute the principle of "appointment for cause only" for that of "removal for cause only."

One specific change often urged is that in practice competitive tests do not indicate the fittest, and alleged instances of its failure in this respect are cited. The method, in common with other human agencies, is not infallible and should not be judged by its exceptions, but if so judged it certainly would not suffer in a comparison with the patronage or spoils method. As an instance of its failures outside the public service the valedictorians of college classes, claimed to be the very flower of competition, are contrasted with those low in their classes who have subsequently achieved more wealth and fame. If the competition had been one that tested capability for such successes, there would be some force in the contrast, but on the other hand the college examinations are and should be essentially scholastic.

It is also possible that the valedictorian may have his use in the world, and become pre-eminent in some sphere of activity less brilliant and prominent than that of his classmate. The competitive grading at the West Point Military Academy, which for nearly a century has distributed in the order of their merit the members of the graduating classes to the several branches of the service, has not been abandoned because some who graduated low became famous generals in the recent war.

"Would the late Alexander T. Stewart or Commodore Vanderbilt have passed in a competitive examination for a clerkship?" is the form that these caviling queries often take, the deduction being implied that if such successful business men could not pass, the principle of competition is false. The obvious answer is, that these men might have made very poor government clerks; that the ambition and conscious power that made one a great merchant and the other an owner of vast railroads would never have been content with the restricted range of an office desk. But had the public required in its service one having the highest mercantile qualities or the insight of a successful investor, Messrs. Stewart and Vanderbilt might have entered the competition with the highest assurances of success.

Somewhat analogous to the foregoing are the complaints that the higher grades of officers are not selected also by competitive tests, and which are the same as were urged in England thirty years ago by Sir G. C. Lewis, the defender in Parliament of the patronage system as a prerogative of the aristocracy. He said, "If competitive examination be so efficient a means of securing the best men, why not choose by it your Lord Chief Justice as well as your junior clerks?"

To this it was well replied "that the examination was proposed as a test of untried men — or if that answer be not enough, we may add that the Chief Justice is in fact appointed as the result of an open competition of the most satisfactory kind, in which his pro-

fessional brethren had done their best to get before him ;” and the contest had been conducted under the public observation.

It is common to speak of these examinations as mere “school-master’s tests” that limit successful application to boys and young men just from the schools. The real fact is that the tenor of the examinations thus far in this country has been so pitched as to give the advantage to men of mature age. The average age of those placed upon the eligible lists during four years of these examinations in the New York Customs service was thirty-one years. The United States Commissioners report the average age of the 3,542 candidates examined last year at thirty-one years, and the average age of the candidates thus far in the State examinations is thirty-two years, and probably the same is true as to the examinations in Brooklyn and New York for the municipal service.

This is certainly a high average in years for the “babes and sucklings” some journals have feared would monopolize the service. In all these examinations, great care has been taken in selecting questions and problems that would not be bookish, but such as represent the ordinary concerns of life, and which every intelligent citizen should be conversant with. Experience in these has shown that while the recent school-boy may answer glibly such questions as may be found in the text-books, he is at disadvantage when the questions are so framed as to represent the practical affairs of business; he is better versed in abstract arithmetic than in its concrete application. So, too, in questions given as a test of general intelligence, as in geography and history, the practical features are better comprehended by the man than the boy. That this is so does not weaken the force of the opinion that the examinations might better be based upon the educational status of the young man just from the common school, since it is highly probable that he would in a short time prove to be a better clerk than the elder man.

He would have no erroneous methods to unlearn, no stubborn habits and pride of opinions that resist discipline.

If the younger man, “with all the world before him,” has such a contracted ambition as to decline all other avenues to business, and accept the tame career of a government clerk, the probabilities are that he would prove a more efficient and tractable subordinate than the elder man, who, having failed in private ventures, enters the civil service very often as a temporary make-shift. There is no reason why in a well-ordered public service the same general principles should not obtain in this respect that are adopted in private business. In the banks, great insurance companies and other concerns that in their magnitude and affairs closely resemble the government offices, the lower positions are filled by the young men who, gradually trained in the business, are advanced as their capacities and the opportunities jointly offer.

Another allegation is that the competitive system excludes those who have not had the benefit of the higher and more costly means of education. Now the fact is that in the five years of competitive

examination. in the United States service, the number of those having only a common-school education has been seventy per cent of the whole number, and in the State service it has been seventy-two per cent.

These ratios probably correspond with the proportion in private business concerns, and proves that all classes of citizens, whatever the nature of their education, have equal opportunities. Could any system be more thoroughly democratic?

Other critics have affirmed that competition would encourage "cramming" and that a superficial knowledge would win the prizes over real and solid attainments. Like all other objections, this was advanced long since when the first movement was made to reform the British service. Thirty years ago, the eminent statesman and historian, Macauley, and his colleagues, emphatically expressed their conviction that with competent and trained examiners, "it is utterly impossible that the delusive show of knowledge which is the effect of the process popularly called cramming, can ever be successful against real learning and ability." Since this was said, the competitive method has been developed, until it covers nearly the whole service of the empire, and with its growth, there have sprung up special tutors and schools, and special text-books for training those desiring to enter the service, and the result has been no appreciable injury to the service, but on the other hand a benefit in the interest in a broader and more exact education, stimulated by the new incentives offered by a public service open to all ranks and conditions upon the single basis of superior fitness.

Much has been said; particularly by appointing officers, regarding the confidential relations that subordinates bear to the head of an office or department. This is generally an absurd claim, as the cases where any such confidential relation actually exists, form only an infinitesimally small fraction of the service. There are rare contingencies where a private secretary or other confidential employe may be essential, but the vast bulk of the public business is business that is and should be public in every sense, and nothing can be more ridiculous than the assertion that there are mysteries, reservations and secrets that are to be cloaked and suppressed; in fact, such concealment always suggests danger to the public interests. The term "private secretary" is often abused to find an excuse for nepotism, and the whole claim of confidential relation is made more laughable by the recollection that under the patronage system these highly important places were generally filled without even a shadow of the precautions and safeguards that the Civil Service rules now throw around the selections.

And there has been a similar exaggeration as to the value of what is called, in a general way, "business experience," which cannot be measured by examination and must be taken upon testimonials more or less trustworthy. There are, of course, certain kinds of training or experience gained in private affairs that may be serviceable in public transactions of the same nature. Thus, an experienced bank-

teller might be very efficient in a like position in a public treasury or a person might have had valuable and approved experience in some public place that would especially fit him for a similar position. But the general term "experience" is very misleading when proffered as a prime factor in estimating qualifications for the Service, and those who have had to do with the appointments in the Service of no term that has been so abused, when employed in the usual vague way, without specific application.

There are those also who censure any educational tests for positions as those of messenger, orderly, watchman, or where the duties are those of an artisan. It is admitted that in these employments, character, physical qualities, and in some cases manual skill are the paramount requirements; but beyond this a certain amount of education is advantageous not only in itself, but also as an evidence of trained intelligence. As illustrating this, may be given the account of the great Willimantic Thread Works in Connecticut by a recent English traveler and investigator.*

In answer to an inquiry, Colonel Burrows, the manager of the great factories, asks, "Why is it that the Willimantic thread lifts more ounces of dead weight and is smoother than any other?"

Every manufacturer can buy the same cotton and the same machinery to work it. Why, then, the superiority of our product? Simply because they are made by people who know more than other people in the world engaged in the same work. They put more brains into their work than others do. They are intelligent enough to know the value of care, intelligent enough to be conscientious about employing it, and intelligent enough to know best to apply it with skill to produce the best results. That is why it pays us directly to increase their knowledge."

For three years there were posted in all the entrance halls of the mills the notice that "no person who cannot read and write will be employed in these mills after July 4, 1884," and since that date the rule has been enforced.

In these great factories employing thousands, and which in their beneficent and profitable management exhibit one phase of the progressive solution of the great "labor question," it is found that even work that is wholly mechanical and monotonous educated intelligence has a practical and commercial value. Indeed there is no kind of human labor that is not improved and exalted by a higher intelligence in its discharge, and this intelligence is vivified and trained by education in the schools. The occasional examples of ignorant persons who render certain services with fidelity and zeal do not disprove the truth of the general proposition, since they are rare exceptions and there remains the certainty that education would have increased the usefulness of these few exceptions. The aristocratic conservatism that long resisted popular education upon the pretext that universal knowledge by the poorer classes would produce discontent and

* Old World Questions and New World Answers by Daniel Pidgeon, F. G. S., Inst. C. E.—London and New York, 1885.

them for the drudgery of the world's work has been happily replaced by a broader humanity and a higher conception of the obligations of the body politic to all its members. Universal education, to the extent even of compulsion, is now accepted as the most urgent duty of the State, and it would be indeed a rash or thoughtless man who should say that the training of the common school made the watchman more stupid or the fingers of the mechanic less facile, or that such training is not useful in these and every other vocation in life.

In addition to these general objections to the competitive examinations, there are frequent challenges of the system based upon individual cases. It is occasionally asserted in conversation or in the public journals that some one has been rejected in the examinations, though eminently fitted to discharge the duties of the situation sought, and the charge is often made with such circumstance and force as to gain credence in the absence of denial. No doubt the accuser often believes he has good cause for complaint, and in rare cases the cause may be good. All human agencies are at times fallible, and now and then an individual competitor may accidentally be underrated by the examiners.

In practice all personal considerations are reduced to the minimum, and the grading of the several papers is made under regulations and invariable methods; but in the best devised plans errors of estimation may occasionally occur.

For such errors the regulations provide an accessible and prompt remedy by the opportunity given to every competitor to examine, personally or by agents, his papers and the markings thereon, and to have detected errors made by the examiners, corrected by the Commission upon protest.

Where the charge of injustice is made, however, by a friend of the competitor, it generally arises from an ignorance of all the facts or from that imperfect knowledge men usually have concerning the abilities of their friends. In every case within my ken, where protesting friends have examined the answers made by a presumptively aggrieved competitor and the marking thereof, they have professed astonishment at his mistakes or his ignorance. A man's associates may for years enjoy his social qualities and not suspect his ignorance of the "rule of three," or that he cannot spell correctly the simple every-day words in his mouth; or again his signal abilities in some one direction may blind them to his deficiencies in all others. When the accusation of injustice comes from the disappointed competitor himself, there is usually a striking illustration of self-deception. Again and again I have heard the protesting competitor declare that he had answered properly every question, and when confronted by these answers and the correct solutions sadly confess that he had overrated himself. The revelations in these cases that have come to my personal knowledge have illustrated an inherent defect in the patronage system, where an appointment was based upon the personal representations of the appointee or the estimates

of his ability given by friends. Hereafter when any plausible accusation is publicly made that the methods of examination are incurably defective or their administration is unfair, because of individual failures to pass, it is to be hoped that the accuser will call for the complete record and abide by its public demonstration. It is due to the reputation of the examiners that their explanatory or defensive evidence should be as public as the accusation against them.

SUBJECTS IN EXAMINATIONS.

Recently the public attention has been attracted to the subjects on which competitors are examined and to the particular questions propounded to them. A part of this attention is due to an intelligent interest in the proper application of the new methods and a part has been aroused by the publication of fabricated questions for the purpose of depreciating the merit system. Scarcely a day passes without some public declaration that stokers are examined in geology and astronomy or policemen required to give the number of pints of water in the Mississippi or the latitude of Hong Kong. Absurd as are these inventions, their frequent repetition would indicate that they gain some credence with the ignorant, which is, undoubtedly, the purpose of their fabricators.

In the initiatory steps of a new system there must be something tentative which may be modified as experience is gained. Much in this direction has already been accomplished, and the examination papers are now much more satisfactory than at the outset, and improvements will continue to be made as examiners become more skilled. Whatever defects have existed in the examination papers, they have not been of a character to injure the service.

The general principles that have governed the preparation of examinations for the State service have been, viz. :

1st. To require for every position vouchers as to moral character, sobriety and industrious habits, and of satisfactory physical condition.

2d. To demand for the lower positions the ability to read, write and perform the four fundamental processes in arithmetic; in fine to have the rudimentary education of the free schools.

3d. To make the examinations measure, so far as may be, the qualifications of the position sought, and with this purpose in view, to test general intelligence as evinced by information on such subjects as form a part of the ordinary education open to all citizens.

4th. Where the first position sought is of a series of grades, the lowest one, above which the vacancies are to be filled preferably by promotion, to make the examination, so far as possible, test the intellectual capacity and aptitude of the competitors to advance in proficiency and become worthy of promotion.

These general outlines will indicate why certain subjects, which do not superficially appear to be pertinent to the duties of a certain position, may be invaluable as tests of trained intelligence, requisite

not only for the narrow duties of the place immediately in view, but also for those to which the incumbent may be transferred or obliged to assume in the varied exigencies of the business in every public office.

So far in the State service, competition has been confined to the educational examination, but the Brooklyn municipal examiners have extended it to matters of character, habits, reputation and business experience. The results of this interesting experiment will be of great value, and if successful, the method will undoubtedly be generally adopted.

In the published schemes for clerkships the range of subjects remains the same as at the date of the last report, except that to the optional list has been added "expert penmanship." Handwriting remains as one of the obligatory subjects and carries a large relative weight, but in order to supply a demand from several offices for expert penmen to be selected under the third section of the seventeenth rule, candidates are now permitted to exhibit their skill with the pen as a distinct accomplishment.

Spelling is tested by accuracy in writing down the words in matter dictated, and grammar by the general correctness in this respect of the answers to the questions on all subjects, or by original composition, as in letter-writing. These methods, being a true measure of practical acquirements, are superior to those which require the correction of misspelt words, or of false syntax in given sentences, both of which tend to become scholastic.

There has also been added to the obligatory subjects for messengers, orderlies, etc., "writing down from memory the substance of matter orally communicated." As the principal duties of employes in these grades are to carry out verbal orders, or to convey verbal messages, the above test of their intelligence, perception and memory is valuable.

The very comprehensive scheme of subjects for asylum physicians has been given under another head. A committee of the Bar Association of New York city has aided in the determination of subjects for examination of clerks and officers of the courts. A similar committee, appointed by the American Society of Civil Engineers, is in consultation with the Commission in the preparation of standards of qualification for the several grades of engineers in the State service, and in determining the subjects and scope of examination for testing such qualifications.

Whenever desired by them, the competitors have been examined in such optional subjects as have been placed on the respective schemes, and several have availed themselves of this chance to demonstrate proficiency in special branches of education.

For clerkships the optional subjects selected have been book-keeping and the French and German languages. In an examination for places in the Immigrant Depot at Castle Garden competitors were tested in the German, Swedish, Norwegian, French, Italian and

Spanish languages. The successful competitor for the place of third assistant physician at the Hudson River Hospital, was examined optionally in Latin, German, French, and in practical microscopy, standing high on all, and maximum on the last subject.

EXAMINING BOARDS.

The full statements accompanying the report of the Commission exhibit in the ample lists of examiners the great enlargement of its means for holding examinations not only at the capital but at all places in the State convenient to any considerable number of positions under the rules. The functions of the examiners under the civil service law are essentially judicial and great care has been taken to select for these positions citizens of such high reputation as would be a guaranty of absolute fairness in the conduct of the examinations. The discriminating care taken by the Commission in this respect has been reflected in the excellent condition of the records and in the fact that not a single allegation of injustice as to the conduct of the examination or in the grading of the candidates has yet been made. The notably high class of citizens who have accepted the position of examiner, in most cases as a gratuitous public duty, justifies the request of the Commission that induced the amendment to the law, permitting persons not in the State service to render these important duties. In every case where the citizen invited to act as examiner or representative could do so without injury to other trusts, he has accepted the appointment as an obligation of citizenship, and this in itself is a signal proof of the great popular interest in the regulation and improvement of the civil service under the law.

To these public-spirited gentlemen and to the capable general board at Albany I am greatly indebted for counsel and assistance in the examinations during the past year.

Their unselfish devotion to the highest public interests is convincing proof that in their hands there will be no retrogression in the work allotted to them in the future.

CIVIL SERVICE OF CITIES.

Under the direction of the Commission I have given a great deal of time to the regulations for the municipal service and have been in frequent consultation with the mayors of the several cities, particularly of Brooklyn and New York, and also with the respective examining boards.

I have already spoken of the important work, especially in the extension of competition, accomplished by the examining board of Brooklyn. The very able advisory board at New York has given great time to the preparation of regulations for that city, as also to a thorough classification of the service and the elaboration of methods of examination. Its report as also that of the Brooklyn examining board gives in detail the transactions in the two cities during the

past year. I have visited several other cities and believe that their mayors are now generally prepared to enforce the regulations as required by the statute.

The beneficent results of a plan that rescues the public service from partisan greed and abuses, and from selfish perversions through patronage, will be more patent in the great cities than elsewhere. The methods prescribed in New York and Brooklyn for the examination of candidates for the police force, based upon the report made at your request by a committee of which Mr. Edward Cary, of New York, was chairman, are the most thorough and satisfactory tests of qualification for executive places yet devised anywhere.

When relieved from certain features of dependence upon the police board and certain antagonistic legal provisions which now weaken their force, these methods will in time raise the police force of these cities to the highest degree of efficiency.

The growth of a healthy public interest in municipal reform has been aided by the full application of the civil service law to the cities and that interest will sustain and encourage the officers intrusted with the enforcement of the regulations.

In closing this report I beg leave to return my thanks for the kind consideration, courtesy and cordial support in my official work extended to me by yourself and your associates.

I have the honor to be very respectfully yours,

SILAS W. BURT,

Chief Examiner.

APPENDIX B.

AMENDMENTS TO RULES AND SCHEDULES, AND STATISTICS OF EXAMINATIONS.

CHANGES OF DISTRIBUTION AMONG THE SCHEDULES UNDER RULE

Transfers from Schedule C to Schedule A.

Principals, professors and teachers in normal schools; chief clerks of courts.

Transfers from Schedule C to Schedule B.

Class II. Civil engineers and surveyors; chemists.

Class III, Subdivision II. Superintendents and assistant superintendents in charge of public buildings under the general superintendent.

Class IV, Subdivision III, Grade I. Rodmen and levelmen.
Grade II. Assistant engineers below the rank of resident.

Class VI, Subdivision II. Physicians.

Transfers from Schedule D to Schedule B.

Class III, Subdivision IV. Steam engineers.

Class VI, Subdivision IV. Steam engineers.

Transfers from Schedule C to Schedule E.

Class VII, Subdivision III. All assistant physicians and pathologists in insane asylums, except those in the lowest grade.

ADDITIONS TO THE SCHEDULES.

A. Counsel and cashier of the Excise Board of New York; 1 assistant of surrogate of New York.

B. Class III, Subdivision III. Interpreters in courts.

C. Class II. Health officers.

Class III, Subdivision I. Court stenographers; excise inspectors.

EXCEPTIONS FROM THE RESTRICTIONS AS TO RESIDENCE AND CITIZENSHIP IMPOSED BY RULE XXXV.

By request of the trustees of the Hudson River State Hospital such restrictions were removed as to applicants for the positions

Upon the representation of the superintendent of the Elmira State Reformatory that, on account of difficulty in securing candidates for the position of guard, he desired to open this position to residents in the neighboring parts of Pennsylvania, the restrictions were removed by resolution of the Commission December 5, 1884.

Regulations for the examination of health officers.

The examination papers, when prepared, shall be printed and transmitted to the county judge of every county where examinations are to be held, and the examination shall be before and under the supervision of the county judge, who, when the examination shall be completed, shall immediately transmit the papers to the Commission at Albany.

Provisional rule concerning the employment of persons required is the management of convict labor on State account in the prisons of the State.

Approved October 14, 1884.

GROVER CLEVELAND,
Governor.

LIST OF APPOINTMENTS.

SCHEDULE B.

Comptroller's office.

John J. Walsh, Albany, third grade, February 8, 1884.
 Wm. K. Brown, Albany, third grade, February 15, 1884.
 Michael A. Nally, Albany, third grade, February 16, 1884.
 Frank H. Brandon, Coxsackie, third grade, February 20, 1884.
 Henry A. Vanderpoel, Albany, third grade, February 20, 1884.
 Geo. D. Ferris, Albany, third grade, February 20, 1884.
 John R. Powers, Canandaigua, third grade, February 20, 1884.
 O. V. B. Taylor, Roxbury, third grade, March 5, 1884.
 Prine Cavert, Rhinebeck, third grade, March 5, 1884.
 John J. Murphy, Albany, messenger, January 1, 1885.

Castle Garden.

John C. Niglutch, New York, second grade, June 12, 1884.

General inspector of rifle practice.

R. M. R. Nelson, New York, second grade, May 31, 1884.

Elmira Reformatory.

J. S. Houghtaling, Elmira, prison guard, May 23, 1884.
 P. O. Rickey, Elmira, prison guard, May 23, 1884.
 S. L. Meddaugh, Elmira, prison guard, May 23, 1884.
 Edward Toole, Mt. Morris, prison guard, June 2, 1884.
 James F. Beecher, South Granville, prison guard, July 1, 1884.

Civil Service Commission.

John C. Birdseye, Jr., Pompey, second grade, June 1, 1884.

SCHEDULE C.

Comptroller's Office.

Charles E. Martin, Malone, State prison clerk, January 17.
 Alexander Kennedy, Albany, assistant auction agent, January 17.
 John J. Moriarty, New York, auction agent, Met. Dist., Jan. 25.

State Engineer and Surveyor.

Thomas Murphy, Mechanicsville, inspector, February 14.
 Thomas Foley, Albany, inspector, February 14.
 G. V. Rapp, Canajoharie, leveler, February 14.
 Charles G. Douw, Poughkeepsie, leveler, February 14.
 G. C. Baldwin, Fort Edward, rodman, February 14.
 C. H. Barber, Greenwich, rodman, February 14.
 Lawrence Gaul, Albany, rodman, June 3.

Martin Schenck, Whitehall, rodman, August 2.
 C. L. Johnson, Kingston, assistant engineer, February 14.
 Frank Lamouree, East Albany, chainman, February 14.
 John C. Slattery, Albany, chainman, February 14.
 Chas. G. Whitbeck, West Troy, surveyor Hud. Riv. Imp't., June 3.
 G. V. Rapp, Whitehall, assistant engineer, August 2.
 Frank Lamouree, Whitehall, rodman, August 2.
 George I. Bailey, Albany, leveler, September 11.
 G. D. Baltimore, Troy, leveler, October 24.
 Charles A. Sweet, Albany, assistant engineer, November 14.
 O. F. Ballston, Albany, assistant engineer, November 14.
 Martin Schenck, Albany, leveler, November 14.
 M. A. Wilbur, Albany, rodman, November 14.

Asylum for Insane Criminals, Auburn, N. Y.

Dr. Thomas L. Wells, Flatbush, assistant physician, June 2.

Willard Asylum, Willard, N. Y.

P. M. Wise, M. D., Willard, superintendent, November 19.
 Henry E. Allison, M. D., Waterloo, first asst. physician, Nov. 19.
 Juliet W. Wyman, Dansville, matron, January 6.

Asylum for Idiots, Syracuse, N. Y.

James C. Carson, M. D., New York, superintendent, December 1.

Hudson River State Hospital, Poughkeepsie, N. Y.

Frederick Peterson, first assistant physician, November 18, 1884.
 Charles E. Atwood, third assistant physician, December 25, 1884.

Supreme Court, Kings County.

Joseph W. Carroll, court attendant, January 16, 1885.

Number of positions in Schedule D filled under the Civil Service rules from January 4, 1884, to January 1, 1885, 386.

STATISTICAL SUMMARY OF PERSONS ADMITTED TO COMPETITIVE EXAMINATIONS.

Birth-place.

In State of New York	191
In other parts of the United States	1
In foreign countries	2
Total	294

Occupation.

Mechanics and laborers	66
Clerks	4
Lawyers	11

Eighteen other kinds of business.....	92
Unemployed.....	24
Total	236

Average age of candidates thirty-two years.

Had been previously in civil service, 2 ; had been previously in United States military service, 6 ; had been previously in United States naval service, 1.

Education.

Common school	160
Academic	73
Collegiate	3
Total	236

Examined for clerks, grade 1.....	5
Examined for clerks, grade 2.....	50
Examined for clerks, grade 3.....	88
Examined for messengers.....	8
Examined for orderlies.....	42
Prison guards.....	43
Total	236

Average standing 79.015.

Number that finished examination	230
Number who withdrew.....	6
Total	236

Number who passed examination.....	170
Number who failed.....	66
Total	236

DISTRIBUTION IN THE SCHEDULES OF THE EMPLOYES IN EACH DEPARTMENT.

	A.	B.	C.	D.
Executive chamber.....	2	4	..	.
Secretary of State	1	13	..	
Attorney-General.....	3	6	..	
Treasurer	4	3	..	
Comptroller	2	19	6	
Engineer and Surveyor.....	1	14	6	
Banking Department.....	1	3	..	
Insurance Department	4	15	..	
Superintendent Public Works.....	5	46	19	696
Superintendent Public Instruction...	1	7	..	

	A.	B.	C.	D.
Indian Reservation .....	..	13	8	
Superintendent State Prisons.....	1	1	..	
Sing Sing .....	..	79	3	
Auburn .....	..	53	3	
Clinton .....	..	45	3	
Railroad Commision	1	4	..	
Civil Service Commission.....	2	1	..	
Superintendent Public Buildings ...	..	47	1	36
Regents of the University .....	..	6	1	
Board of Health .....	..	5	21	
Board of Charities.....	1	2	..	
Commissary-General .....	..	4	1	
Adjutant-General .....	..	5	..	
Inspector-General .....	..	2	..	
Department Rifle Practice .....	..	1	..	
Court of Appeals	2	4	5	
State Survey.....	1	7	..	
Adirondack Survey.....	..	12	..	
State Library .....	..	..	6	
Bureau Labor Statistics.....	..	1	..	
State Museum .....	..	..	4	
Onondaga salt springs	1	..	56	
Willard Asylum.....	1	9	4	168
Utica Asylum.....	1	10	4	80
Binghamton Asylum.....	..	4	3	37
Buffalo Asylum	1	3	2	35
Middletown Asylum.....	..	3	2	51
Auburn Asylum.....	..	1	2	18
Asylum for Idiots, Syracuse.....	..	9	5	28
Hudson River State Hospital.....	1	4	1	38
House of Refuge, Randall's Island..	..	22	9	11
Western House of Refuge.....	..	16	2	10
Elmira Reformatory .....	..	29	1	2
Asylum for Blind, Batavia.....	..	13	2	5
Emigrant Hospital, Ward's Island ..	..	7	2	39
Castle Garden.....	1	19	1	4
	<u>38</u>	<u>571</u>	<u>183</u>	<u>1,258</u>

The following positions have been included in the classified service since the original promulgation of those rules, and are additional to the above:

Court officers and clerks	350
New York Board of Excise.....	50
Health officers under general act.....	1,000
	<u>1,400</u>

APPENDIX C.

CORRESPONDENCE.

To the Honorable the Judiciary Committee of the Assembly :

In response to the request of your Honorable Committee, the Civil Service Commission has the honor to submit the following suggestions in reference to a bill before your Committee, "defining and restricting the powers of the Civil Service Commission in regard to certain qualifications in receiving and considering applications for appointment to the Civil Service of the State.

I. The bill has been drawn under a misapprehension of the existing law, and the powers of the Commission under it. The Governor of the State alone has the power to establish a classification of the Civil Service, and to promulgate the rules to regulate it (§§ 2, 6 of the act).

The function of the Commission is to aid the Governor, as he may request, in preparing suitable rules for carrying the act into effect.

2. The Commission properly and necessarily perform the work, but the Governor's approval can alone give it vitality. This is similar to the National Civil Service in which the rules are established by the President.

The fixing of the rules by the chief executive officer instead of by a statute, seems wise. Flexibility in rules, and the power to speedily modify them to meet emergencies, and to correct mistakes, are indispensable in the early stages of an administrative reform like Civil Service. Like power has been conferred upon the Judges of the Court of Appeals with regard to rules for admission to the bar. The delegation of such a power is purely a question of policy and expediency.

II. The bill in question is not in harmony with the intent of the Civil Service Act, but is opposed to its principles, and if it should become a law would tend to defeat the object of that act, and embarrass its execution. It would substitute an arbitrary statute for mere rules which may be changed or modified in the discretion of the executive as the necessities of the service, justice to the people, and enlightened public sentiment, may seem to require.

III. The system of appointment to subordinate positions in the public service established by the Civil Service Act, which had nearly

the unanimous sanction of the Legislature, irrespective of party, is based upon two great fundamental principles — first, the right of the State to the highest attainable excellence in those who are to fill its positions of trust — and second, the equal right of its citizens to compete for those positions upon the ground of merit. Civil Service is a practical application of the Jeffersonian test of honesty and capacity for public trusts. Rules are only instrumentalities for ascertaining with certainty and impartiality, these necessary qualifications.

IV. Of the qualifications constituting fitness — physical, moral, mental and personal — the first especially, and others in some degree, depend upon age. The vigor of body and mind required for useful service do not ordinarily co-exist with the tenderness and inexperience of extreme youth, or with the feebleness of advanced age. Some limitations in respect to age of persons *entering the service*, therefore, are necessary. And rules in such matters must be founded upon the average or general experience of mankind, and not upon exceptions or rare instances.

This has accordingly been done in respect to many offices both under the National and State governments. In the military service the maximum age is forty-five; in civil offices of an elective character the minimum age is twenty-one and in some cases higher. Under the Civil Service rules the minimum age is fixed at twenty-one. It may be that for some unimportant positions, like messenger, the minimum might probably be lower. But a modification of the rules can readily adjust that. A maximum age has not, as yet, been fixed by any rule. In a synoptical statement, prepared for convenience, the maximum is tentatively stated as forty-five, in analogy to the military rule, but when a rule shall be authoritatively adopted and promulgated, it may be found expedient to fix it higher. Suggestions on that or any other subject would always be gladly received.

If the Legislature should see fit to prescribe limitations of age, it has the undoubted right to do so, but to admit as applicants persons of all ages or any age, would be inexpedient and calculated to encourage unreasonable aspirations, and unnecessarily increase the labors of examining boards and of the Commission.

V. The second section of the bill establishes a privilege as an exception to the general rule as to who may be admitted, not only without competitive examination, but without any examination whatever as to their present fitness for the service. It assumes that persons who have once held positions in the service to the satisfaction of a head of a department, have a right superior to the rest of the people to enter the service again. It is an assumption, at variance, both with the right of the State and the rights of the people at large. The fact that a former employe was certified to be satisfactory to a former employer, does not prove his fitness for the same post or a

similar post at the present time, or at some future time; and the fact that he has held office in the past gives him no superior right to hold it in the future. It introduces a new element entirely opposed to the principles of Civil Service, as a reason for appointment, viz.: reward for former service.

The great aim of Civil Service is to separate appointments from all connection with political affiliations, favoritism or patronage, and base them simply on fitness for the post with an equal right to every citizen of the proper character, age and qualifications to compete for them on grounds of absolute equality.

All of which is respectfully submitted.

By direction of the Commission.

ALBANY, *January 28, 1884.*

JAMES A. BETTS,
Secretary.

NEW YORK, *February 4, 1884.*

Z. R. BROCKWAY, Esq., *General Superintendent New York State Reformatory, Elmira, N. Y.:*

SIR — Your communication of the 30th ult. to the Civil Service Commission has been referred to me for answer.

The varied character of the State Service, and the indefinable inter-relations of its parts, or, I might say, with more cogency in regard to the greater portion, the absolute lack of relations between its parts, have made the immediate establishment of the new system at all points simply impossible. Thus the general relations to be enforced through the Superintendent of Prisons fails as to your institution, which is outside of his department. But there is no apparent reason why similar regulations should not be made directly applicable to the Reformatory.

In regard to the prisons the points now established are, that the original appointment shall be to the position of guard, the keepers to be selected from the guards, and the higher paid keepers promoted from the ordinary grade of keepers. It is unnecessary to explain to you the reason for this course of gradual training, since I may presume that it will accord with the views of one so experienced in the service as you are.

The guards are selected by competitive examination of those who have perfected their applications in the form prescribed by the rules. I have directed a copy of the blank application to be sent to you; and I believe it will explain fully to you the requirements as to physical condition and vouchers for character and temperament. The age is not to be less than twenty-five, nor more than forty years.

The educational test is confined to the ability to write legibly matter dictated, to spell tolerably and perform accurately problems in elementary arithmetic. The physical test is severe as you will see by the blank forms.

Persons employed in all the State institutions in any of the positions below the grade of prison guard are examined at present by provisional boards at the various asylums, etc., selected by the Commission from such of the higher officials in these institutions as are recommended by the Superintendent as competent to act as examiners. There are seven such boards, besides the central examining board at Albany.

Please inform me if you consider your guards and keepers as of the same class as those in the prisons, and whether they should be subjected to the same conditions.

Our act is entitled "An Act to regulate and improve the Civil Service, etc." In many of the State institutions the service has been reputably rendered and administered through the high character of those intrusted with the responsibility. But there was absent such a regulation as would make the system of selection for employment uniform and formal, with ample records, and which would tend to give it permanency and protect it from the abuses arising from that purely partisan interference, which has long tended to reach every public concern.

The system leaves the power of removal unrestrained as it should be to insure subordination and discipline.

The high reputation you have as an administrator would give great value to your suggestions on any point connected with the general service, while as to matters in your own institution I would respectfully request your opinion in full.

I am, sir, with great respect,

Very sincerely yours,

SILAS W. BURT,

Chief Examiner.

NEW YORK, *March 21, 1884.*

Z. R. BROCKWAY, Esq., *Sup't State Reformatory, Elmira, N. Y.:*

DEAR SIR — I have yours of the 18th instant. The Civil Service Commission meets on the 24th, when the persons recommended by you will, without doubt, be approved as a board of examiners for positions in Schedule D.

I have mailed you to-day a copy of the rules, regulations, etc., for the use of the Board and would like to have its attention particularly directed to rules 27 to 29 and to general regulations 9 and 31.

I fully appreciate your remarks concerning the reluctance of applicants to submit to an examination or to conform to any method or rule different from the accustomed ones.

This disadvantage has been encountered wherever the new system has been introduced, but it soon disappears when a full knowledge of the system is gained. I also agree with your axiom that the position should seek an occupant rather than be sought, but, like so many other axioms, it is "more honored in the breach than in the observance." I can conceive no greater exaltation of the public service than that attained by a free selection of subordinates by administrators — capable, pure, unselfish, and, rarest of all, absolutely free from outside interferences or the imputation of personal ends — but such a millennial state is so far off, that we must still submit to existing conditions and strive by general rules of action to control abuses.

Very respectfully yours,
SILAS W. BURT,
Chief Examiner.

ALBANY, *March* 13, 1884.

To his Excellency, GOVERNOR CLEVELAND:

SIR — The New York Civil Service Commission deemed it advisable to recommend to your Excellency that the maximum age for admission to the Civil Service of the State, excepting prison guards and keepers, be fixed at fifty years, and that the minimum age for messengers be fixed at eighteen years. The Rules as adopted do not fix a maximum age, and the minimum for messengers under the existing rules is twenty-one years.

It seems to the Commission that the two changes recommended are desirable and will tend to disarm opposition and will not impair the service.

The resolutions of the Commission are as follows:

Resolved, That the maximum age for application for clerical positions in Schedule B of the State Civil Service Classification be fixed at fifty years at the time of application.

Adopted, February 26, 1884.

Resolved, That the minimum age for messengers shall be fixed at eighteen years.

Adopted, March 7, 1884.

The Commission respectfully requests your Excellency's approval of the foregoing resolutions and that they be embodied in the Rules.

Very respectfully,

By order of the Commission,
C. B. ANGLE, *Secretary.*

EXECUTIVE CHAMBER, ALBANY, *March 14, 1884.*

I hereby approve the foregoing resolutions, and direct that the rules be modified as therein provided.

(Signed) GROVER CLEVELAND.

LAW DEPARTMENT, OFFICE OF THE COUNSEL TO THE }
CORPORATION, NEW YORK, *March 14, 1884.* }

*To the Secretary of the New York Civil Service Commission,
Albany, New York:*

DEAR SIR — Will you please inform me whether clerks, court criers and attendants in the city court (formerly the Marine Court) in this city are considered by your Commission as falling within its regulations, and whether such Commission is prepared to examine applicants for those positions? The Civil Service Act provides, that after the expiration of eight months from its passage, no person shall be admitted to, or promoted in, either of the classes arranged by the Governor as covering the various subordinate officers and clerks in the public service of the State until he has passed an examination before the Civil Service Commission.

The city court is one of the courts of this State. (Code of Civil Procedure, § 2; *Landon v. The Mayor*, 7 Jones & Spen. 467; 53 N. Y. 627; *Whitmore v. The Mayor*, 67 id. 22; *Quinn v. The Mayor*, 44 id. 266.)

It would therefore seem that such clerks and attendants should be considered as in the public service of the State, and as such included in those who are to pass an examination, *provided* they are included in any of the classifications made by the rules. What purports to be a copy of these rules and regulations is before me, and, by reference to rule 20, I see that schedule "C" is described as including a large number of different positions, among which are enumerated court criers and attendants. I am, however, informed that your Commission does not consider the clerks and other officers of the Surrogate's Court in this county as coming within the classes to be examined, and, therefore, before expressing an opinion as to the interpretation to be put upon the Act and Regulations, would like to be advised as to the views of the Commission itself.

If not too much trouble, would you please inform me what courts, if any, in this county are deemed by the Commissioners to be included within the provisions of rule 20?

The enumeration of the courts in this county will be found in sections 2 and 3 of the Code of Civil Procedure.

Will you please also send for the use of this department copies of the approved rules and regulations of the Civil Service, and greatly oblige,

Yours very truly,

E. HENRY LACOMBE,

Assistant to the Counsel to the Corporation.

STATE OF NEW YORK,
OFFICE OF CIVIL SERVICE COMMISSION, }
ALBANY, *March 24, 1884.*

E. HENRY LACOMBE, *Assistant to the Corporation Counsel, New York city :*

SIR — Your communication of March 14th, relating to the appointment of employes connected with certain courts in the city of New York, has been received and duly considered by the Civil Service Commission.

In answer, the Commission would respectfully state that under the decision of the Court of Appeals in the case of *Whitmore v. The Mayor, etc.* (67 N. Y. 21), the clerks (except the county clerk and his deputies), court criers and attendants of the city courts of the city of New York must be regarded in the Civil Service of the State, and, therefore, subject to the classification and rules of the State service.

The decision referred to, relates to clerks of district courts; but the principle of that decision embraces the clerks, criers and attendants of the following courts :

The Supreme Court, the Oyer and Terminer, the Superior Court, the Common Pleas, and the Court of General Sessions.

The county clerk and deputies appointed by him are not, in the opinion of the Commission, subject to the rules, for the reason that they are county officers and only *ex-officio* court clerks.

I am, sir, very respectfully yours,
(Signed) JOHN JAY,
President.

Circular note of the Commission to the Chief Judges of the city of New York.

STATE OF NEW YORK,
OFFICE OF CIVIL SERVICE COMMISSION, }
191 Second Ave., New York, *April 11, 1884.*

The Honorable CHAS. P. DALY, *Chief Justice of the Court of Common Pleas, New York city :*

DEAR SIR — The Civil Service Commission are advised by their associate, the Hon. Augustus Schoonmaker, the late Attorney-General of the State, that the courts (including the Court of Appeals) have decided that the courts of New York city constitute no part of the municipal government, but form part of the judicial system of the State. (*Whitmore v. The Mayor*, 67 N. Y. 21, and *Rowland v. The Mayor, etc.*, 84 N. Y. 372.)

The clerks (except deputies of the county clerk), attendants and criers, would seem, therefore, to be in the State Civil Service, and

applicants for these positions will consequently have to be examined under the rules of the State Civil Service Commission.

I beg leave respectfully to ask, on behalf of the Commission, in case this view is approved by the Justices of the Court of Common Pleas that we may be advised :

First. Of the number, duties and compensation of the officials referred to.

Second. Of the qualifications required for their positions.

Third. Of the character of the examinations, whether in the opinion of the court, they should be competitive or non-competitive.

Fourth. Of any suggestions which the judges may be willing to make on the subject.

In conclusion, I would add, that the Commission earnestly hopes for the co-operation and moral support of the judges.

I have the honor to be, dear sir,

With great respect, faithfully yours,

JOHN JAY.

Reply of Chief Judge DALY of the Court of Common Pleas :

NEW YORK, *April* 28, 1884.

DEAR SIR — In reply to your inquiries, I beg leave to state that there is a clerk appointed by the court who, by the statute, appoints his deputies, of which there is one principal deputy and ten others. There are fifteen attendants, or, as we call them, officers, the Court of Appeals having decided (*Sweeny v. The Mayor, etc.*, 5 Daly, 274 ; affirmed 58 N. Y. 625), that they are officers with the powers of constables and marshals, and three stenographers. The officers and stenographers are appointed by the court.

We have no crier. When that office was created the court consisted of a single body or session of which he was the crier.

It now consists of five parts : the Special Term, the Equity Term, two Trial Terms, and the General Term, or appellate branch. This being the case we have ceased to appoint a crier and directed that his duties, in each part, be discharged by the officers attending it, thereby dispensing with an unnecessary office and the salary incident to it.

The clerk is the chief ministerial officer of the court. His duties embrace a variety of duties which would occupy a great deal of space to enumerate. In general terms he has charge of all records, documents and papers of the court. The entry of all records, orders, judgments, or other matters, are made by him or his deputies ; and as we hold him responsible for the strict and accurate discharge of every duty pertaining to his office, he has to maintain a constant supervision over all his deputies.

The qualifications required of him are such as may be inferred from this general statement of the nature of his duties.

He has to be acquainted with all the statutes of the State or of the United States that regulate or in any way affect the discharge of

his duties as clerk. He must also be familiar with all the provisions of the Code, and have a considerable amount of specific legal information.

The duties of his deputies are chiefly clerical. The principal deputy acts throughout the day in the main office to receive papers, tax costs, and to receive and answer all communications relating to the general business of the office.

Each of the five parts when sitting has a deputy who acts as its clerk keeping its minutes, swearing jurors and witnesses and preparing its calendars. The remaining deputies are employed in the routine business of the general office, each having particular duties or departments assigned to them.

The three stenographers attend in the five different branches of the court as their services are required. Their office, I assume, sufficiently indicates the nature of their duties and their qualification.

The duties of the officers or attendants are stated in the decision to which you refer (*Rowland v. The Mayor, etc.*, 83 N. Y. 376), to be "in aid of the proper business of the court * * ; among others, to be present at its sittings, to execute its commands, to secure due order in its proceedings and attend upon jurors." They also act as messengers of the judges in court and out of court, in the judges' official communication with each other, in the transmission of opinions, papers and other business pertaining to the courts which brings them in very close personal relation with the judges.

The annual salary of the clerk is \$6,000; of the chief deputy \$2,000. One of the others receives \$2,000, and the rest \$2,500 annually. The difference in these salaries arises from the fact that some of them come under the act of 1882, known as the Public Burden's Bill, and others do not.

Each attendant or officer receives \$1,200 annually. These salaries are uniform, because no officer has been appointed since the passage of the above act. Each of the stenographers receives \$2,500 annually, and all the above salaries are fixed by statute.

This, I think, embraces the information you requested in your view that these appointments came under the Civil Service Act of 1883. If it is not sufficiently full or explicit, it will afford me great pleasure to give it more in detail, or any additional information desired; and in conclusion, I beg leave to say that the Commission may always feel assured, to use your own language, of the "co-operation and moral support" of the judges of our court.

I have the honor to be, with great respect,

Very truly yours,

CHAS. P. DALY.

Reply of Chief Judge SEDGWICK of the New York Superior Court:

JUDGES' CHAMBERS, NEW COURT HOUSE, }
New York, *April* 29, 1884. }

DEAR SIR — I have the honor, for all the judges, to say in answer to your letter of April 12, 1884, that the Superior Court of the city of New York was created by statute that specified its powers and jurisdiction. The judges of the court were by section 9, chap. 137, Laws of 1848, directed to appoint its clerk, by section 39 of the Code of 1849 to appoint its crier, by chap. 529 of Laws of 1853 to appoint the officers necessary to attend the court, and by section 256 of the Code of 1849 to appoint the stenographers for the several terms of the court. The 12th section of the sixth article of the Constitution, ratified December 6, 1869, declared that the Superior Court, etc., and other named courts "are continued, with the powers and jurisdiction, they now severally have."

The clerk of the court appoints his deputy and assistants by virtue of the statutes.

The clerk has an annual salary of \$6,000. His qualifications are a knowledge of such part of the practice of the law as relates to the recording of the proceedings in the court and of the duties enjoined on him by various statutes, principally by the Code of Civil Procedure, an ability to exact from his assistants and the attendants of the court a full performance of their duties, and a sense of the importance of preserving sacredly records in his charge.

The deputy clerk should have like qualifications. His annual salary is \$5,000.

There are thirteen assistant clerks. Eight of them have annual salaries of \$2,500, one an annual salary of \$2,000, two annual salaries of \$1,500, and two annual salaries of \$1,200. They have distributed to them various duties, such as preparing calendars, attending as clerks in court, calling and fining jurors, administering oaths to witnesses, directing officers in charge of juries, entering proceedings in books, taxing costs, filing papers, searching the records, meeting applications to the office for papers or information.

The qualifications are principally of a clerical kind.

The qualifications of stenographers are indicated by the name of their position.

The attendants of the court are fourteen in number. Nine of them have an annual salary of \$1,200, and five of \$1,000. Their principal duty is to attend the sessions of court. Their qualifications cannot be stated with much definiteness, as they relate to the personal character and conduct of the individual, such as honesty, sobriety, steadiness, good temper, habits of obedience and good propriety of conduct. I am not able to make any suggestions that would seem to me to be valuable to you in regard to examination for qualifications.

You will have perceived that what legal question may be involved in the matter that has been referred to, there is none that has a

practical bearing now, or which, as we think, should now delay you in proceeding under the act of 1883, according to your own opinions as to the application of the provisions of the act.

I have, for the judges and myself, the honor to be,

Very respectfully your obedient servant,
JOHN SEDGWICK.

STATE OF NEW YORK,
OFFICE OF CIVIL SERVICE COMMISSION, }
ALBANY, *May 20, 1884.*

The Honorable JAMES O. CARTER, *President of the Bar Association of New York city :*

DEAR SIR — The numerous clerks and attendants employed in the courts of record in the city of New York have by decisions of the courts been adjudicated to be in the State service.

This renders necessary an examination, under the Civil Service Rules, of persons who may be applicants for those positions.

The State Civil Service Commission must, therefore, appoint a board of examiners for those positions, and prescribe the qualifications and examinations required.

As the Commission desires to act in harmony with the judges of the different courts and the bar of the city in the performance of this duty, it will be glad to have the co-operation and assistance of the Bar Association in this matter.

The Commission, therefore, respectfully requests the Bar Association through you as its president, to appoint a committee of its members to confer and advise with the Commission on this subject. Early action by the Bar Association in this regard will be esteemed a favor.

Very respectfully,
JOHN JAY,
President.

CIRCULAR LETTER TO MAYORS.

STATE OF NEW YORK,
OFFICE OF CIVIL SERVICE COMMISSION, }
ALBANY, *June 13, 1884.*

To His Honor the Mayor of the City of ——— :

SIR — By recent enactment of the Legislature, regulations for admission to the Civil Service are made mandatory in all the cities of the State. A copy of the original Civil Service Statute, as amended by the last Legislature, is herewith inclosed for your information and convenience of reference.

By the provisions of the act as amended, you will observe that the Mayors of all cities are required to establish and promulgate regulations for the Civil Service of their respective cities, within two months from the time of the passage of the amendatory act, and after the termination of three months from the passage of the act, no appointments can be made except from those examined pursuant to the regulations, or of those exempted by the regulations.

And as a valid appointment of persons eligible under the regulations is essential to authorize the payment of salaries or compensation, the importance of prompt action is apparent.

It is also desirable that the regulations for the various cities of the State should be as nearly uniform as the charters and circumstances of the different cities will permit; in fact, the statute requires the regulations for cities to conform to the general principles prescribed for the State service.

The act was passed on the 29th day of May, 1884, and the two months in which regulations are required to be made will expire on the 29th day of July, 1884.

The State Commission having aided the Mayors who have already established regulations under the original act, and having in view the importance of securing uniformity throughout the State, will gladly extend the same courtesy to all the other Mayors, and assist them, so far as such assistance may be desired, in the classification and regulations required by the new and unfamiliar duties imposed by the statute.

If agreeable to you to avail yourself of the advisory aid of the State Commission, you will greatly facilitate its co-operative labors, by transmitting to the office of the Commission at Albany at once a statement setting forth every position in the municipal service of your city, arranged under the respective departments of your city government, the tenure of office, the duties, the salaries or mode and amount of compensation, and the mode of appointment.

Positions in the educational department need not be reported, as they are excepted by the statute, but all other departments are subject to the law, and must be provided for by the regulations.

Any communication you may desire to address to the Commission on the subject referred to, for information or advice, will receive prompt attention.

Very respectfully,
JOHN JAY,
President.

Commissioner SCHOONMAKER to the Attorney-General (approved by the Commission).

KINGSTON, *July* 31, 1884.

DEAR SIR — I have the honor to acknowledge the receipt of your communication of the 30th inst. with reference to the increase of salaries of clerks in your department, and inquiring whether such

increase, under legislative authority, is to be deemed promotion under the Civil Service rules.

I assume this increase of compensation is made under the clause in the Appropriation Act (Chap. 243, Laws of 1883), which appropriates a lump sum and authorizes the Attorney-General to fix and designate the salaries of the several persons employed in his office out of the appropriations therefor made in the act, and also under the clause in the Supply Bill of the present year providing for deficiencies.

Your communication does not state the amount of the proposed increase of salary in each case, so that it does not appear whether such increase will or will not affect the grade of the clerk as defined by Rules 7 and 30 of the Civil Service rules.

If such increase does not in fact raise the salary to a higher grade, no question of promotion can arise. For illustration, in the case of a clerk receiving \$1,500 per annum, an increase of salary to any sum less than \$1,800 per annum is not promotion under the Civil Service rules.

It may be partial or capricious, or without good cause, but it is not promotion, and if made under legislative authority it is valid.

But in a broader sense I think the authority given by the Legislature to distribute a specified sum among the clerks and other employes of your office as compensation for their services is not promotion.

It involves no change of duties ; no vacancies are filled ; no one is any higher or lower than he was before.

The Legislature, for reasons satisfactory to itself, increases the compensation, leaving the *status* of the clerks in all other respects unchanged. I discover no promotion in this, in the Civil Service sense.

I disapprove the practice of lump appropriations to be distributed by heads of departments, and regard them as liable to abuses, but that is a legislative matter.

These in brief are my views of the question, and you are at liberty to exhibit them to the Comptroller.

Very truly yours,
A. SCHOONMAKER.

ALBANY, *August 1, 1884.*

HON. ALFRED C. CHAPIN, *Comptroller, Albany:*

SIR — I have the honor to inform you that the Railroad Commissioners have been authorized to appoint provisionally, without examination, an expert official to examine and calculate the maximum safe bridge-strains of the various bridges of the railroads of this State.

The necessity for the work has been represented as urgent, and the high technical qualifications for it are so rare that it is at present

difficult to find a competent board of examiners. It is believed that after the usual summer vacation the American Institute of Civil Engineers will give aid to the Commission in devising suitable schemes of examination for this and other grades in that profession.

The Dairy Commissioner, recently appointed under chapter 202, Laws of 1884, has been intrusted with novel duties requiring expert assistance of various kinds, and at the outset somewhat tentative as to methods.

Until a definite course of action is adopted, and some experience in the best methods for administering the law is gained, it will be impossible to define the precise functions of the several officials employed by the Commission, or to determine the scope of requisite qualifications.

Under these circumstances the Civil Service Commissioners have authorized the Dairy Commissioner to make provisional appointments terminable whenever his department is so organized as to admit of qualifying examination of the employes.

Very respectfully yours,

SILAS W. BURT,
Chief Examiner.

ALBANY, August 2, 1884.

HON. ELNATHAN SWEET, *State Engineer and Surveyor, Albany, N. Y.:*

SIR—The recent non-competitive examinations of persons nominated for positions of assistant engineer and rodman, on the Champlain canal improvement, confirm me in my opinion, formed after similar examination in February last, that all the positions of like character in the State service should be filled through open competitive examinations.

The most of the persons thus far certified by non-competitive examinations as being qualified have been merely passable, *i. e.*, have only reached the point where it seemed possible to certify them. This is ascribable to natural causes, since the area of selection being narrowed to those who presume that personal influence can prevail in obtaining appointment, the great mass of trained men refrain from making application.

I believe that your own observance will lead you to agree with me that as a general proposition the interests of the public service would be subserved by opening the access to the minor positions to those best fitted without regard to personal and partisan considerations. Of course the positions so treated would be below the grade where original responsibility would be incurred or the highest professional qualities required.

In the British service and recently for the positions of leveler and rodman in the Brooklyn service open competition has been successful in securing highly qualified appointees, and the same method will

doubtless soon be applied not only to the service of New York city, but also to that of all the other cities in the State. It is probable that the American Institute of Civil Engineers will be requested to aid in the establishment of uniform standards of qualification for the various grades and thus aid in making the quality of service both efficient and stable.

I write this to invite your consideration of the matter, since the Governor will probably be requested to withdraw the positions in question from Schedule C and place them in Schedule B under the Civil Service rules.

I am, sir, very respectfully,

SILAS W. BURT,
Chief Examiner.

STATE OF NEW YORK,
OFFICE OF THE STATE ENGINEER AND SURVEYOR, }
ALBANY, N. Y., *August 18, 1884.*

S. W. BURT, Esq., *Chief Examiner, New York Civil Service.*

SIR — Your letter of the second instant relative to the advisability of subjecting applicants for the subordinate positions in this department to competitive instead of non-competitive examinations, was received during my absence from town. In reply I would say that I approve most heartily of your suggestion.

It has been a matter of surprise to me that trained young engineers do not apply for these positions, but I suppose it is owing to the fact that the appointments to them have been political and the tenure of them insecure.

The result has been that it is now difficult to find educated and accomplished engineers sufficiently familiar with our canals, and with practical canal engineering to be properly equipped for filling the higher responsible positions in this department.

The remedy doubtless is to fix a high standard of admission, as the natural result of civil service rules is security of tenure for the fittest.

I will gladly render any assistance in my power in establishing proper standards of qualifications.

Very respectfully yours,

E. SWEET,
State Engineer and Surveyor.

NEW YORK, *September 26, 1884.*

Dr. STEPHEN SMITH, *State Commissioner in Lunacy, 31 West Forty-second Street, New York city:*

MY DEAR SIR — Your letter addressed to me at Albany has been forwarded to me here.

I appreciate the motives that have led you to decline to act as an examiner of candidates and nominees for positions in the asylums, since your paramount official function is the inspection of these institutions. I believe, however, that there are such grave reasons why you should be a member of the examining boards that you may be induced to withdraw your declination upon the assurance that such arrangements will be made as will not impair your independence and usefulness as an official critic.

The Civil Service Commission has felt that in the examinations for the higher positions in the service and particularly for those where both professional or expert skill and administrative ability were necessary there should be as members of the several boards State officials, having a thorough knowledge of the requirements for the positions.

Efficient service in these demands not only a certain scholastic and technical attainment but also a special aptitude for the executive duties in each position, and such aptitude can be tested only by an official acquainted with the particular requirements of the respective places.

But the prime reason for insisting upon your presence upon all examining boards for the higher grades of service in the asylums originates in the desire of the Commission to sustain and enforce a consistence and harmony in procedure and a uniform standard of qualification for similar positions in the different institutions. I believe you will agree with the Commission that such a constancy of procedure and uniformity is not only essential to the best administration in the asylums but is a prime object in the regulation and improvement of the Civil Service required by the act constituting the Commission. The State asylums have been established as distinct and isolated institutions and unlike any other branch of the State service, have no general supervisory executive head.

Without reference to the wisdom of this policy it is apparent that such an isolation imposes upon the Commission a direct responsibility in the establishment of uniform standards of qualification.

As the State Commissioner in Lunacy you are the sole official whose functions extend to all the asylums and are of such character as to give you a thorough acquaintance with both their common and special needs. In order that you may aid the Commission in securing the best results in the examinations without impairing your official independence it is proposed that you act as chairman of all boards of examiners for the higher service in the State asylums for the insane, and that as chairman you shall not prepare any questions nor make any markings or gradings, but shall preside at all meetings of such boards, with power to aid the Chief Examiner in prescribing

the scope of the examination subject to the provisions of Rule 24 and to decide all differences between the examiners subject to an appeal to the commission.

This would relieve you from all participation in or responsibility for the action of the board relative to the persons examined and would give you such general powers as would greatly aid in securing the purposes of the Commission as above set forth.

The Commission will hold a meeting at the New York Hotel in this city on Monday the 29th inst, and on its behalf I respectfully invite you to be present to confer with its members. The most convenient time for your reception will be between the hours of two and four in the afternoon.

I am, sir, with great respect,

Your obedient servant,

SILAS W. BURT,

Chief Examiner.

ALBANY, *November 12, 1884.*

Dr. SAMUEL O. VANDERPOEL, 36 *West Thirty-ninth St., New York city :*

SIR — At a meeting of the Civil Service Commission, held on the 10th inst., a communication from Dr. Alfred Ludlow Carroll, executive office of the State Board of Health, under date of November 6, 1884, was read calling the attention of the Commission to the fact that health officers of the several cities, villages and towns of the State are in the State service and therefore subject to Civil Service regulations, and suggesting that provisions be made for a method of examination of such persons, and on motion it was

“Resolved, That the Commission take action to secure the selection of competent physicians as health officers in accordance with the suggestions of Dr. Carroll, and that the Chief Examiner, Col. Burt, Dr. Stephen Smith, the State Commissioner in Lunacy, and Dr. S. O. Vanderpoel, be and are hereby appointed a committee to report to this Commission at the earliest practicable day a plan for the designation of boards of examiners, and the examination and selection of persons for health officers for the cities, villages and towns of the State.”

I am, sir, very respectfully yours,

SILAS W. BURT,

Chief Examiner.

STATE LUNATIC ASYLUM,
UTICA, N. Y., *November 17, 1884.* }

MY DEAR SIR — At the time of the competitive examination for assistants at the Hudson River Asylum, and at the reception of your

letter subsequently, I was not able to do any thing beyond a part of my own work here.

I had submitted to an operation, the convalescence from which I thought would be brief. The operation was much more severe than I contemplated, and I can hardly say that I have yet convalesced.

I regret that I was not able to confer with you previous to the preparation of a scheme of examination or join in the examination of applicants.

After the appointment of an examining board last spring (Drs. Smith, Moore and myself), and the reception of your letters of June, calling my attention to the importance of a general scheme as a basis of examination, I gave the matter considerable thought and drew up such a scheme. Dr. Moore being at the time in Europe, I went to New York for a conference with Dr. Smith, both of us hoping to see you there at the same time. You were, however, absent. In your letters of June you referred to the examination made by our board for an assistant at the State Asylum for Insane Criminals, and stated that another application would soon come up from the Hudson River Asylum. I heard no more upon the subject until I saw the advertisement in the New York Medical Record, by its managers, for applicants for two assistantships, and subsequently the notice in the public papers of the appointment of examiners for the special purpose, among whom but one of the original board, Dr. Smith, was named. Your letter of October 27 sufficiently explains the matter and shows that the publication in the newspaper was premature and did not fully represent the action of the Commission.

I have carefully read the questions used at the competitive examination inclosed by you. Dr. Macdonald forwarded a set of questions relating to the part of the examination assigned to me, and which, on account of my illness, he had conducted.

Inasmuch as a competitive method was requested by the authorities of the Hudson River Asylum, I do not see that your Commission could take any other course than to adopt it.

For the position of assistant physician in a State asylum, it seems to me that the competitive method has disadvantages.

The statutes require that the superintendent shall nominate to the board of managers the assistant physicians, and that the managers shall appoint. This would seem to suggest that the superintendent should have the power of selecting, with the approval of the managers, the officers immediately associated with him and with whom he, as the executive head, shall conduct the institution. Can he shift the responsibility of such selection either to the managers or a Commission and assume only the acceptance of those provided for him? Taking the statutes and the rules of the Civil Service Commission together, should he not select one or more persons by name and refer them to the Commission under a competitive examination to determine whether they have the qualifications required by the position and the rules of the Commission, and subsequently present the name of the one best accredited by him in nomination to the managers?

The relation of the assistant physician to the superintendent is intimate and vital to every interest of the institution.

The superintendent, who has the prime responsibility, should have assistants whose character, competency and fidelity he could unconditionally trust in carrying out the principles involved in administration of the trust he holds and for which he is responsible.

The policy of institutions should be, and has been, to secure responsibility under tried experience. This is essential to insure fitness in all high places. Where there is more than one assistant physician, the lowest position should be filled by primary examination, and those above by promotion. Any institution in existence for a few years under such a system, well administered, would have competent and experienced officers in subordinate positions for promotion.

In my judgment, no first assistant should be appointed who had not had practical experience and to the extent of practical knowledge of administration in a State asylum.

The statute declares that "the first assistant physician shall perform the duties and be subject to the responsibilities of the superintendent in his sickness or absence."

Therefore at any moment he may be called to discharge all the duties of the superintendent. It seems to me of the first importance, at the outset of Civil Service, to make no mistake on this point. I cannot think that any one who appreciates the responsibility which attaches to the organization and administration of a State asylum would appoint a supervisor of a department whose character, ability and fitness for the place had not been tested by experience. How much more a first medical officer, whose duty is to supervise supervisors of every department and assume at any time the functions of the whole administration.

It seems to me, whether competitive or non-competitive examination is selected by the superintendent to fill such positions, he should know enough personally of the character of the applicant in a general way to determine, before an examination was asked, if the candidate was entirely satisfactory if he passed the examination. In my experience I have had applicants who would have passed an examination most creditably, but who had drawbacks not easily described, which would have rendered them unsatisfactory to me but entirely acceptable to some one else.

I can readily see how examinations, competitive and non-competitive, may answer in securing clerks, book-keepers, etc., in connection with officers of State, where the appointing and dismissing power is single, and only capacity and integrity are required to discharge certain defined work. Such persons are not charged or likely to be, with the administrative duties of the department. Besides, it must be borne in mind that the medical officers of an asylum are in constant association as a family and equally in their duties. It is important to success that the superintendent should exercise such judgment in selecting his staff as would insure harmony and unity

of purpose and action, when they are required together, "to carry out the plans and instructions of the superintendent in the best manner they are able." While it is true that there cannot be success in an asylum without a responsible executive head, it is equally true that to insure this he must have a staff of men whom he can direct separately or as a unit, and who feel and appreciate this and cordially and intelligently co-operate; such administration requires knowledge of the candidate, independent of educational and professional qualifications. The superintendent (and managers) might waive all the deep responsibility, and say: Give me such men as you may consider qualified, and I will do the best I can with them.

But as I understand the system of Civil Service in its relations to asylums, it is co-operative with their constituted authorities in the aim to secure higher qualifications and the elevation of the asylum service and to aid, by legal sanction, the purposes which have been heretofore left largely to custom and the individual action of superintendents; that the aim is to do this without intrusion into the jurisdiction or responsibility of the managers or superintendent.

That the managers and the superintendent are to be held to the full exercise of their powers and responsibilities in the administration of their trust, and responsible for the character and results of such administration. The course recently taken by the trustees or managers of the Pennsylvania Hospital for the Insane at Philadelphia, in filling the vacancy of office of medical superintendent caused by the death of Dr. Kirkbride, is an instructive lesson. This is one of the oldest and best known asylums of the country. Dr. Kirkbride stood in the very front rank of this branch of the profession. The managers might have found a man in Philadelphia or in the State who could pass an examination for the position. They were not willing to confide the responsible interests of a great charity to any but experienced hands, to one trained and tried in administrative work. They came to this State and took one of the men trained under its lunacy system — Dr. Chapin, of Willard.

In regard to a point which Dr. Smith talked to me about: whether the questions of the examinations should be made public or not, my judgment would be against it. A general scheme of qualifications might be published, but it seems to me the questions ought not to be made public any more than the answers. This would save a great deal of indiscriminating criticism and some heart-burnings.

The judgment of the Commission or their examiners in regard to any successful applicant, is all that the public needs to know or is really interested in knowing. I might suggest, and I do this with all deference, that the Superintendent of Public Instruction might be added to the original examining board, and when an applicant was presented by the superintendent of any institution for examination, the Commission might add an additional member suggested by the board of the institution, to act in that particular case as the representative of that institution. Such a board of examiners, under the chief examiner, would doubtless command the confidence of

the public and the institutions. I shall hope to see you within a few days in New York.

Yours, very truly,

Col. SILAS W. BURT,

Chief Examiner Civil Service Commission.

JOHN P. GRAY.

Circular note to Presidents of Colleges, Principals of Normal Schools, and others.

STATE OF NEW YORK,
OFFICE OF THE CIVIL SERVICE COMMISSION, }
ALBANY, Nov. 18, 1884. }

To Hon. WM. L. BOSTWICK, *Ithaca, N. Y.:*

DEAR SIR—The Normal schools being State institutions, the Principals and Teachers in those institutions are in the public service of the State. Some classification of those positions under Civil Service rules is, therefore, necessary to regulate the mode of filling them.

Three modes are provided by the rules.

First. To place them in Schedule A, which permits appointments without Civil Service examination.

Second. To place them in Schedule B, the positions in which are conferred by the appointing power, by selection from those persons graded highest as the result of open competitive examination.

Third. To place them in Schedule C, under which the examinations may be non-competitive.

Competition, as the fairest mode of ascertaining merit, is the ultimate aim of Civil Service reform, and seems the only practical plan to supersede favoritism.

The tendency towards competition, both in the State service and in the service of cities, for all positions filled by examination, is rapid and strong, and embraces here, as in Europe, the higher positions of dignity, scholarship and professional skill.

The competitive mode has been adopted by the National Education Office of Ireland, for the four inspectorships of the National schools, and the National Commissioners report "that great advantages arise from testing the candidates by competitive examination," and add that "they hope the Civil Service Commission will kindly have such examinations held, as hitherto, when vacancies occur."

Recently, in the State service, a board of examiners, consisting of eminent physicians, held a competitive examination for the place of assistant physician in the Hudson River State Hospital for the Insane, at Poughkeepsie; a post with a salary of \$3,000 and maintenance. It was attended by thirteen competitors, some of them men of large experience; and a thorough examination on papers prepared

by eminent experts, was concluded by a practical test at Ward's Island, in the cases of actual lunatics and their proper treatment.

In classifying the positions in the Normal schools, the Commission desires to act with caution and prudence, and to consider carefully any objections, should any be made, to opening the positions (excepting perhaps that of principal) to competitive examinations. Any examinations should manifestly be under the joint supervision of the State Superintendent of Public Instruction and the Regents of the University, or such persons as they may approve.

I beg leave, on behalf of this Commission, to ask you to favor us with your views on this subject; indicating the class in which you think professors and teachers in the Normal schools should be placed, and, adding if you please, the reasons for your opinions.

I have the honor to be, sir,

Very respectfully yours,

JOHN JAY, *President.*

UNIVERSITY OF THE STATE OF NEW YORK. }
BOARD OF REGENTS, ITHACA, Nov. 25, 1884. }

Hon. JOHN JAY, *President of the Commission, Albany, N. Y.:*

MY DEAR SIR—Replying to your circular of inquiry, dated Nov. 18, would say, my judgment is, that principals of Normal schools should be appointed without special regard to Civil Service examinations. For the reason, that principals should be chosen for their reputation and experience as instructors and their recognized executive ability. Teachers in Normal schools, should come under the requirements of Schedule C.

The gift for imparting instruction is not always accompanied with the highest scholarship displayed in competitive examination. However examinations should be required as evidence of thorough qualification to instruct in those subjects taught in our Normal schools.

Very respectfully yours,

WILLIAM L. BOSTWICK.

FREDONIA, N. Y., Dec. 1, 1884.

Hon. JOHN JAY, *President Civil Service Commission, Albany, N. Y.:*

DEAR SIR—Your communication of November 18 past, was duly received. Supposing the meeting of principals of Normal schools called at Albany for December 9, to supersede the request for

other answers to your letter I shall not trouble you with further written reply unless you express your desire for it.

Yours sincerely,

F. B. PALMER,

Principal State Normal School.

STATE NORMAL SCHOOL;
ALBANY, N. Y., Dec. 4, 1884. }

Hon. JOHN JAY, *President Civil Service Commission, etc. :*

DEAR SIR—I have the honor to acknowledge the receipt of your circular of November 18, with request that I “favor you with my views” regarding its subject, and that I indicate the mode in which appointments should be made of members of the faculty of a State Normal school.

FAVORITISM.

The examinations are for the purpose of avoiding favoritism in appointments. What I shall say will be in reference to the State Normal school at Albany. As a graduate of the school; as having been a member of its executive committee; as its president; as the compiler of its history and the history of its alumni of forty years, in which work I had free access to all documents and records relating to its affairs and its management; I feel that I have become somewhat acquainted with the singleness of motive that has actuated the members of the executive committee who during that long period have had it in charge.

In all my knowledge thus acquired of its history, in the traditions of the executive committee, nothing is known of an appointment or a change based upon any thing but an anxious desire to put into place the person best fitted in all ways for the duties of the position.

That the appointing power has been well placed and wisely and successfully used is proved in the printed history which I herewith submit, and to which I respectfully call your attention.

That the appointments have been judiciously made is indicated by the length of service of the appointees. The present faculty may be used as an illustration. It consists of thirteen persons. Of these, one, with a vacation to lead the Normal school company in the war, has been in continuous service for twenty-nine years; three have each served fifteen years; one, thirteen years; one, nine years; one, six years; one, two years; her predecessor, still a member, has served six years; one two years, filling a vacancy caused by the death of one who died at the close of six years; one, one year — she was appointed and then spent a year in Europe fitting herself for the duties of the position. The present President follows one who resigned by reason of age, after a term of fifteen years. The executive

committee, as at present constituted, has not made an appointment. It will be seen that a sort of Civil Service examination has been in force when I say that every member of the faculty, with the exception of the professor of music, is a graduate of the school, and by act of the legislature, passed April 11th, 1849, may be supposed to be competent teachers :

“ Every teacher shall be deemed a qualified teacher who shall have in possession a diploma from the State Normal school.”

At that time this was the only Normal school in the State.

QUALIFICATIONS.

A teacher in a normal school should possess a general knowledge of books, and a particular knowledge of those subjects which he will be expected to teach — so far, his information can be tested by examination ; but, other qualifications are of vital importance.

The teacher in a normal school should be one who has studied the human mind as the instrument and the object of education ; of excellent principles, and purity of character ; of unsullied reputation ; with full appreciation of the great responsibility of teaching teachers ; of such personal appearance and manners as to be the model which students must sensibly and insensibly form themselves ; with the power to impart, as clearly distinguished from ability to acquire knowledge ; who can recall the difficulties he himself overcame in acquiring his own education, and, so, ready to anticipate the troubles of others in like case, and by a hint to aid them to find a way out of a labyrinth ; possessing entire sympathy with the school, its methods and its students ; having the power to excite interest and to arouse enthusiasm ; of ability to govern by himself having power of self control, and by appeal to reason, to affection, to conscience ; endowed with that indescribable something known as tact.

In conclusion : the normal school, under its executive committee, may be regarded as substantially under the same kind of government as colleges under their board of trustees. It is a serious question whether more faithful and intelligent administration can be secured by imposing on the executive committee restrictions as to appointments.

Already, all needful restrictions are imposed by the law, and by the executive committee, itself. Some of these could not be so well secured by the general regulations which the Civil Service Commission might establish. For instance, it is wholesome and desirable in making appointments in this normal school, that so far as possible, they be made from the alumni of the school, thus regarding them as in the line of promotion ; to open the positions to unrestricted general competition would not be an advantage.

The president of the school, and he believes, the executive committee of the same, are in full sympathy with reforms in modes of administration in general. The appointments, on the theory that they are now practically made under a Civil Service examination,

might be placed under your "Schedule A"; or appointments could be made by the executive committee, conditioned that the appointee, before entering upon the duties of the place, should pass a satisfactory Civil Service examination.

Respectfully,
E. P. WATERBURY,
President.

VASSAR COLLEGE, PRESIDENT'S OFFICE, }
POUGHKEEPSIE, N. Y., *December 9, 1884.* }

HON. JOHN JAY, *President, etc. :*

DEAR SIR — In reply to your circular of inquiry I can only say that it would seem to me to be of advantage to the appointing power if applicants for the post of teacher in the Normal schools could show their literary qualifications by such examination as is best adapted to test them. Certainly appointments would be likely to be made on a more definite basis than when testimonials and general information in regard to the candidate are the only reliance.

I see no reason why the method of examination may not be employed as the chief reliance in determining the qualifications of candidates. Of course such examinations, or the regulations for them, would proceed most naturally from the appointing power, or from the educational authorities of the State, and might be made competitive or not as they should decide.

I have not sufficient acquaintance with the Normal schools to give more than these general impressions, and not at all to give any judgment fortified by argument, such as you probably desire.

Yours very truly
T. L. CALDWELL.

STATE NORMAL AND TRAINING SCHOOL, }
CORTLAND, *December 11, 1884.* }

HON. JOHN JAY, *President of the Civil Service Commission,*
Albany, N. Y. :

DEAR SIR — Your circular letter of 18th of November asks me to indicate the class of positions under Civil Service rules in which I think professors and teachers in the Normal school should be placed, adding my reasons for my opinion.

I have discussed the subject with members of our local board and of our faculty. We are all quite agreed in the following opinion, to-wit:

If the Normal schools of the State are included within the purview of the statute passed May 4, 1884, relating to the Civil Service of the State of New York, then the position of teachers and professors in these schools should be classified in Schedule A, "which permits appointments without Civil Service examinations."

Our reasons for this opinion, based upon the experience of sixteen years in the Cortland Normal School, are the following:

1. The local board of this school has been prompted in all of its administrative acts by strictly non-partisan purposes.

2. Those peculiar and special qualifications, which constitute the crowning excellence of the teacher and measure his value to the school, are those whose nature and power cannot be tested satisfactorily by Civil Service examinations.

Some of these qualifications may be enumerated thus:

Integrity of character, nature and firmness of his moral purposes, that trait of mind by which his processes of reasoning are not eccentric, but are habitually inclined to move correctly; calmness, firmness and strong common sense exhibited under emergencies; fertility in resources, and aptness to teach and enforce truth upon students; power of personality and capability of inspiring students with ambition to rise to high intellectual and moral manhood; adaptation to perform successfully such executive or other special work as may be assigned to him by the organization or by the purposes of the school; loyalty to his obligations; disposition to unite cheerfully with his associate teachers to promote the common welfare of the school.

Entertaining deep sympathy with the objects of the Civil Service Commission, appreciating most highly the labors of the distinguished gentlemen who compose the Board, and thanking the President of the Board for his courtesy,

I have the honor to remain, most respectfully yours,

J. H. HOOSE, *Principal.*

STATE NORMAL SCHOOL,
GENESEO, N. Y., *December 13, 1884.* }

Hon. JOHN JAY, *President of Civil Service Commission:*

SIR — An early reply would have been sent to your recent letter, had I not expected to express to you orally my views upon the questions presented, and I trust that the delay in replying to your communication may not be construed as implying any lack of readiness to accede to your most courteous request.

I may be pardoned, perhaps, for saying that I am in most hearty sympathy with the spirit of Civil Service Reform, and with the ends sought to be obtained by your Honorable Commission. It will, therefore, be evident that any objections which I may urge against such examinations as are proposed for determining the competency of principals, professors and teachers in normal schools, are presented by me, not as an opponent of Civil Service Reform, but as by one desirous of securing the most efficient service possible in these institutions. Allow me, then, to give you, as briefly as may be, my

views upon the plans proposed by your Honorable Commission for examining the persons to whom reference has been made.

The Normal schools may, without any impropriety, be termed *professional* schools, and the work of the instructors in them is to prepare persons to become teachers in the public schools of the State. The successful accomplishment of such a work by the teachers demands, among other qualifications, *first*, exhaustive and accurate knowledge of the subjects taught in schools; *second*, a thorough understanding of the nature of the human mind, and the laws in accordance with which it can be properly developed; *third*, a knowledge of the correct methods of teaching, based upon the principles of mental development.

There can be no difficulty whatever in determining, by suitable examinations, the proficiency of any candidate in the three respects specified above. Indeed, knowledge of subjects to be taught, of the laws of intellectual advancement, and of the proper methods of presenting truth, so as to secure the best and most efficient mental culture, can be determined only by examination, consequently there is no reason why your Honorable Commission may not discover, by proper examinations, the ability of the applicants in the respects indicated.

Again, it is well known that a person may be renowned for thorough and accurate scholarship, for his familiarity with the philosophy of education, and with the most approved methods of teaching, and yet be utterly incompetent to instruct. Multitudes of instances might be enumerated in support of this statement, but it is needless to mention them, since every one can recall such persons among his instructors or acquaintances. Scholarship, philosophy and methods are alike worthless to them, because they lack the tact or ability to apply practically the principles which they can discuss and illustrate in conversation or in an ordinary examination.

It is, however, *possible* for the examiners to determine, by practical tests, the candidate's ability as an instructor. He may be required to exhibit his skill as a teacher by actually doing the work in the presence of those who are to determine his fitness for the position he desires to secure. Consequently, though the examination for determining this qualification may be attended with serious embarrassment, it is nevertheless *possible* to determine with reasonable accuracy the *teaching ability* of any one who may seek an appointment.

There are, however, other qualifications—and they are by far the most important—which no examination, however searching, can determine. Personal worth cannot be estimated from testimonials furnished by the candidates, nor by their answers given to questions upon ethics; the power to control pupils in school cannot be assumed because the candidate shows a familiarity with the principles of self-government or school government. Neither the power to control, the power to awaken mind, the moral influence of the teacher, in short, none of the elements which contribute to the for-

mation of the *moral* and *personal* forces in the teacher, can be determined by any examination whatsoever. And yet these elements should have far greater weight in determining his competency than literary attainments or professional skill.

The end sought for in education is the moral elevation of the masses, and such intellectual activity as is awakened by the education given in schools furnishes a basis upon which the teacher of moral worth and personal influence for the right may produce lasting impressions for good. A teacher who has the qualifications for such a work is certainly serving well the commonwealth; but the evil influence of a teacher of intellectual ability and acumen, especially in a Normal school, where he is a teacher of teachers, can hardly be estimated.

It is unnecessary for me to specify the qualifications which no examination can determine, and yet it is evident that they are many times more essential to the teacher's true success than literary attainment, pedagogical science or professional skill. All that is included in the terms personal influence — the power to awaken interest, to arouse enthusiasm in study, those kindly and sympathetic impulses which are useful not only to restrain from evil but to build up in righteousness, the unseen but not unfelt power of purity and integrity, the culture and refinement which smooth and soften the roughness and rudeness of youthful years, the remembrance of the experiences, desires, hopes, purposes and feelings of the young which makes the teacher a friend and guide to his pupils — all these elude the investigation of the most rigid examiners. And yet they are the very elements in man which determine his power for usefulness as an instructor.

It seems to me, therefore, clearly impossible for an examiner to determine by any examination the fitness of a person for the work of teaching, and, consequently, I am of the opinion that the principals, professors and teachers in Normal schools should be classed in Schedule A of the Civil Service list. It seems to me that any other classification cannot but produce serious embarrassment in the administration of our school discipline and instruction, by preventing us from securing the most competent persons that can be found to fill the vacancies which may occur.

At a meeting of our local board of trustees held a short time ago I mentioned that you had most courteously asked me to express to you my views upon the proper classification of teachers in Normal schools.

An informal discussion of the matter followed in which every member present expressed the conviction that the interests of the schools would be best promoted by classifying the teachers with those who are appointed without a Civil Service examination.

If it should be decided that the persons to be selected as teachers in Normal schools must be chosen from those who have passed a Civil Service examination, I would most respectfully urge, that the examinations be non-competitive, for I am certain that a competitive

examination would very frequently compel us to appoint the most incompetent of all the applicants. I would also earnestly recommend that all persons who are graduates of the Normal schools of the State, be considered as eligible for appointments without further examination.

In conclusion, permit me to say, that unanimity of purpose and hearty co-operation among all the teachers, are absolutely essential to the successful work of a school.

So necessary are such conditions, that one or two instructors have sometimes been known to utterly disorganize a school, and to neutralize all the beneficial results which a score of others have been laboring assiduously to achieve. It is simply to avert such disasters by securing a corps of instructors who will work harmoniously and for the same ends, that I recommend the appointment of teachers for our Normal schools, without a Civil Service examination.

With the hopes that the objections that have been raised to the examinations may seem as reasonable to your Honorable Commission as to me, I remain,

Yours, most respectfully,

WM. J. MILNE.

OSWEGO, *December* 15, 1884.

Honorable JOHN JAY, *President Civil Service Commissioners:*

SIR—In answer to your circular letter asking my opinion in regard to the classification that should be made of the teachers in the Normal schools by your Commission, I would say, if we belong to the Civil Service list, and are subject to the rules and regulations of your Board, that it would be best that we should be arranged in the first class, and for the following reasons:

First. The object of the Civil Service Act, as I understand it, is to see that appointments in the Civil Service are made on the ground of qualifications and fitness for the work to be done.

So far as I have known, the appointments of teachers in the Normal schools have always been made on these conditions alone; and as the spirit of the act has always been carried out, there seems no necessity for any change in the manner of appointment.

Second. Some of the most essential qualifications of teachers are entirely beyond the reach of any formal examination, nearly all of the worst elements are of this character. How, for instance, are we to determine in regard to the power of the candidate to awaken enthusiasm, to win the love and confidence of his pupils, to create an abiding interest in study or awaken a love for the beautiful, to cultivate habits of neatness and order, to control without resort to objectionable measures? Patience, gentleness, frankness, honesty, courage, love and sympathy for children, and many other moral characteristics are of quite as much importance as a knowledge of subjects to be taught, of methods of teaching or principles of education, and

yet we could hardly hope to test them through any formal examination. We can only satisfy ourselves in regard to them, as we know the life and character of the teacher.

Third. The instructors in the Normal schools are teachers of teachers, and should be the highest type of excellence in the profession. Teachers of this class are not novices, and are not as a rule, waiting for positions. They have to be sought for and induced to change positions and enter the Normal school work. They have a reputation that places them above the necessity of the ordinary school examinations.

They are known by their lives, their personal character, and their success, and they would refuse any position that would subject them to a written or formal examination.

It seems to me, therefore, best that our teachers should be arranged in the first list, which would, practically, leave the appointments to be made as they now are, on the ground of known fitness for the position to be filled. To require any formal examination would tend to embarrass rather than to help, and make more efficient the Normal schools.

I am thoroughly in sympathy with the plans and works of your Commission, and shall always be glad to do any thing in my power to help forward the good work you have in hand, and, with this view, if, in your opinion, it would be better that the teachers in the Normal schools should be examined under the rules of your Commission, then I would suggest that they be placed in the third rather than in the second list, for reasons already stated.

With the highest esteem, I am yours very truly,

E. A. SHELDON,

Prin. O. S. N. & Tr. School.

P. S. — At a meeting of the Normal School Board, held December 15, the inclosed letter was read, and on motion of Hon. George B. Sloan unanimously approved, as expressing the sentiments of the Board.

E. A. S.

UNION COLLEGE,
SCHENECTADY, N. Y., *Dec. 19, 1884.* }

DEAR SIR — In reply to your circular concerning the application of the Civil Service rules to the selection of teachers for the State Normal Schools would say that I favor placing them in Schedule B.

This would secure the best material, and at the same time avoid the tendency to always select graduates of a school for its teachers, even though they may not always be the most desirable candidates.

Very truly yours,

To Hon. JOHN JAY.

CADY STALEY.

STATE NORMAL SCHOOL,
FREDONIA, N. Y., Dec. 20, 1884. }

HON. JOHN JAY, *President of Board of Civil Service Commissioners* :

DEAR SIR — Duly appreciating and approving the valuable service of your honorable Commission, it is with diffidence I submit my views in response to your request for an opinion as to the place Normal school teachers should occupy under the Civil Service rules, with reasons therefor.

In the first place, I will consider competitive examinations. As I understand it, these examinations have two objects ; 1st, to secure competency, 2d, to avoid favoritism. In respect to competency, it is held that superior capacity in such matters as are subject to examination shall constitute an absolute claim to appointment against every other consideration, subject to a choice between say three of about equal standing.

So far as such tests are concerned, teachers have been subject to examination again and again from childhood. Inferior capacity and qualifications are almost an impossibility. The question is whether the highest test in formalities that have recognized standards of merit are to be accepted as conclusive against every consideration in regard to which there can be no exact test for want of a recognized standard. For very many positions the elements of merit that can be tested by examination are all-important, and others are of comparative indifference, but for other positions persons passing the highest tests of the school have been failures. As a rule, those who pass such tests become superior specialists but not superior where a practical judgment is required. La Place, as minister to Napoleon I, whose "infinitesimal philosophy" brought his department into direst confusion, was a conspicuous example of the truth in such matters, and in no way an exception to the general rule.

The history of West Point graduates, of graduates from other institutions, argues conclusively to the same effect.

The question that follows on this is, should teachers be sought to do routine work, or for broader characteristics of mind and more varied and versatile ability? It seems to me the teacher should be removed as far as possible from those formalisms that would be the only things to be taken into account for examination.

If this position is correct, we are not to seek for the highest scholarship, but sufficient scholarship coupled with moral character, tact, a right temper, fidelity, personal worth, and influence, the ability to call forth interest and mould character, sympathize with fellow-teachers, with the work and with pupils, a good presence and good habits, sometimes successful experience in the very acquisition of which one will lose ability to pass a technical examination. Any one of these, according to the requirements of a particular situation, might be essential to success, and yet they must all go for naught,

together with a host of social and other advantages, which, it might be said, ought not to be required.

To guard against favoritism of some sort or other is very difficult, but judging from what acquaintance I have with the schools there would not be less but rather more if the restrictions of honor were taken from those held accountable for appointments, and positions were hedged about with formal attempts to guard against it. This condition of things depends upon the esteem in which our educational system is held by our people, but any attempt to devise something to take the place of the esteem should rather follow than precede the loss of it.

The objections to non-competitive examinations seem fewer and of very much less weight. Still I do not see that there is any gain. They would not guard against favoritism and there seems to be no call whatever to guard against unscholarly teachers. Teachers of successful experience are almost uniformly sought and while this is the best test, the best fitted would decline a call that was coupled with conditions of examinations. They would say they would remain in positions they were sure of, and that without trouble.

This and other objections seem not to be counterbalanced by any good to come from a Civil Service examination.

Besides, such examinations would make a class distinction between normal teachers and other teachers, which I should be sorry to see grow up, as it would, in a way, be assuming that the Normal schools had more of a political character than others, a character they are now free from, but which they might easily take on. The Superintendent of Public Instruction might require certificates of a certain grade if he deemed it wise and I see no evil to come from it. I do not understand that the Civil Service law allows any thing but actual Civil Service examinations.

For the above reasons it would be my judgment that the Normal teachers should be classed in Schedule A, or regarded as subject to appointment without examination.

I may add that it is the prevailing judgment of the local board of this school that, if the Normal schools are subject to the Civil Service law, the teachers should not be subject to examination.

Very respectfully submitted,

FRANCIS B. PALMER.

FROM THE HON. GEORGE WILLIAM CURTIS.

WEST NEW BRIGHTON, STATEN ISLAND, N. Y., *Nov. 22, 1884.*

DEAR SIR—I have the honor to acknowledge the receipt of your circular of inquiry in regard to the appointment of principals and teachers to the Normal schools, and in reply I beg to say that I see no good reason why the selection of teachers should not be made by

competition. They are not specialists in any sense that might make such examination inconclusive, nor is there any reason to suppose that the most suitable and desirable teachers would not engage in the competition.

I think the case of the principal is somewhat different. It is not clear that for such a position the most fitting persons would care to enter into competition, and as the appointment would be usually a promotion, the general purpose of the examination would have been already attained. If however, positions generally corresponding to that of principal are submitted to competition my suggestion would not be pertinent.

I am, dear sir, very respectfully yours,

(Signed)

GEORGE WILLIAM CURTIS.

To Mr. JAY, *President Civil Service Commission.*

APPENDIX D.

ATTORNEY-GENERAL'S OPINIONS.

STATE OF NEW YORK,
OFFICE OF THE ATTORNEY-GENERAL, }
ALBANY, *March 19, 1884.*

Hon. JOHN JAY, *President of the State Civil Service Commission,
No. 191 Second Avenue, New York city:*

DEAR SIR—I am in receipt of your favor of the 17th instant requesting my opinion upon the question, whether under the Laws of this State women are eligible to appointment in the official service, and, therefore, entitled to compete with men in the examinations under the Civil Service rules, with a view to appointment in the service.

In reply I would state: Chapter 354 of the Laws of 1883, entitled "An Act to regulate and improve the Civil Service of the State of New York," authorized the Governor to appoint, by and with the advice and consent of the Senate, three persons as Civil Service Commissioners. By that act it was made the duty of the Commission to aid the Governor in preparing suitable rules for carrying the act into effect, and after such rules had been promulgated, the act made it the duty of all the officers of the State of New York to aid, in all proper ways, in carrying the rules and modifications thereof into effect in all of their departments or offices to which said rules might relate.

In the absence of any law of the State prohibiting the employment of females in the public departments as clerks, or in the performance of clerical duties, recourse must be had to the rules of the Civil Service Act, so called, to determine whether that act was intended to forbid the employment of women to perform such duties. By reference to the different sections, as also the rules which have been promulgated by the Commission and approved by the Governor, it will be seen that in many instances the term "his" or "him" is used exclusively; but in section 5 it is provided "Any commissioner, examiner, copyist or messenger herein mentioned, or any other person who shall willfully or corruptly, by himself or in cooperation with one or more persons, defeat, deceive or obstruct any person in respect to his or *her* right of examination according to any such rules or regulations, etc."

In Schedule B, Rule 8, the term "or clerks and *other persons*" is used in the different subdivisions of that rule, and also the term

"clerks and *like employes*." In the same rule, in class 6, subdivision 5, the term "teachers" is used; and in class 7 of the same rule, "asylums, hospitals and similar institutions" is used; and in subdivision 7 the term "teachers" is again used. In Rule 20, Schedule C, class 6, subdivision 2, "principal matrons" are included, and also in subdivision 5, class 7, of the same Schedule C "matrons of asylums" are included; and in Schedule D, subdivision 8, class 7, "attendants, nurses" are included, thereby implying that females have the right of examination, according to the rules and regulations of said Commission.

In 1871, Hon. M. B. Champlin, then Attorney-General, in an opinion addressed to Hon. John T. Hoffman, Governor of the State, as to the eligibility of females to the appointment to the office of notaries public, stated that in his opinion, under existing laws, women were ineligible to election, or appointment, to any civil office within this State, and in support of his conclusions referred to the provisions of the Revised Statutes, "No person shall be capable of holding a civil office, who at the time of his election or appointment shall not have attained the age of twenty-one years, and shall not then be a citizen of this State."

He further stated, that, in order to be eligible to hold a civil office, the person must be invested with the general fundamental rights of suffrage, among which must be included the right to exercise the elective franchise, as regulated and established by the Constitution and laws of the State.

While I am not in the attitude of dissenting from that opinion, nor is it necessary for me to do so, in order to reply to your inquiry, I am of the opinion that there is a distinction between a public officer or civil officer and a public employe; and the distinction seems to be laid down in section 14 of the Civil Service rules, at the latter part of the section, as follows: "The phrase 'public officer' shall be held to include all public officers in this State, whether paid directly or indirectly from the public treasury of the State, or from that of any political division thereof, or by fees or otherwise; and the phrase 'public employe' shall be held to include every person not being an officer who is paid from any said treasury."

The classification of persons under the Civil Service rules seems to include females, and any person not charged with the duties of an executive, judicial or administrative officer, under the Laws of the State, who is hereby appointed to perform clerical duties, the compensation for their services to be paid from the State treasury, should, I think, be classed as a public employe, and I am of the opinion that females have the right to apply for examination under the Civil Service rules, with a view to appointment in the service of the State.

Very respectfully yours,
D. O'BRIEN,
Attorney-General.

ALBANY, *September 12, 1884.*

HON. DENIS O'BRIEN, *Attorney-General* :

DEAR SIR — The Civil Service Commission respectfully requests your opinion whether the appointees of the Excise Commissioners of the city of New York are, for Civil Service purposes, to be deemed in the public service of the city of New York, or in the State service.

The corporation counsel of New York regards them as in the State service, as will be observed by an opinion of his herewith submitted, and that seems to be the view of the courts. The Commission, while also inclined to that view, would like to be fortified by your opinion before taking final action. Your opinion may be sent to our Albany office.

Very respectfully,

A. SCHOONMAKER, *Com'r.*

STATE OF NEW YORK.
OFFICE OF THE ATTORNEY-GENERAL, }
ALBANY, *September 15, 1884.*

HON. A. SCHOONMAKER, *State Civil Service Commissioner* :

DEAR SIR — I have the honor to acknowledge the receipt of your favor of the 12th inst. inclosing an opinion of the counsel to the corporation of the city of New York, upon the question: "Whether the Excise Board of the city of New York is in the State service, or in the New York city service," and desiring me to express an opinion upon the same subject.

Excise legislation, regulating and controlling the sale of liquors by the General Government, was commenced as long ago as the "Long Parliament" in 1643, and our State Government has exercised the same power in reference thereto almost since its inception, without its constitutional right so to do ever having been seriously questioned. The Legislature provides for the appointment of Excise Commissioners, directs how they shall be appointed, prescribes their duties and fixes their terms of office. It creates the office itself. It must, therefore, be a State office and an Excise Commissioner a State officer, whose duty it is to enforce the State laws regulating the sale of liquors. It follows as a natural sequence, therefore, that employes of Excise Commissioners are in the employment of the State and in the "State service."

Very respectfully, your obedient servant,

D. O'BRIEN, *Attorney-General.*

STATE OF NEW YORK,
OFFICE OF THE ATTORNEY-GENERAL, }
ALBANY, *January 1, 1885.*

HON. JONATHAN SCOVILLE,
Mayor, Buffalo, N. Y.:

MY DEAR SIR — I have the honor to acknowledge the receipt of your communication of the 27th instant, in which you request my opinion upon various questions in regard to the application to the various departments and to the Civil Service of the city of Buffalo, of section 8, of chapter 354 of the Laws of 1883, entitled "An act to regulate and improve the Civil Service of the State of New York."

In substance, the inquiry is whether this statute can be applied to appointments in your city and in the various departments organized under your municipal government:

1st, to the Police Department; 2d, to the Fire Department; 3d, to the Water Department; and 4th, to the Board of Health.

The object which the Legislature had in view in enacting this statute was to elevate the Civil Service in municipal governments and to increase and secure its efficiency. Whether the Legislature has or has not secured the purpose that it had in view when it passed the law, it is now too early to express any opinion, even if it were within my province to do so. The wisdom and propriety of this enactment will be better determined hereafter by observation and experience as to the practical working of the statute itself. It is, doubtless, the duty of all executive and administrative officers charged with the duty of construing or executing this law, to give to it a fair and reasonable construction, rather than to nullify it by any strained or unnatural interpretation.

The Legislature certainly intended to apply the provisions of the Civil Service act to certain municipal officers in the several cities of this State, and such construction should be given to it as will best promote and carry out the intention which the Legislature had in view.

Section 8 of the original statute, passed in 1883, was amended by chapter 410 of the Laws of 1884, and that part of it, which relates to the questions embraced in your communication, reads as follows: "The mayor of each city in this State is authorized and is hereby directed to prescribe such regulations for the admission of persons into the Civil Service of such city as may best promote the efficiency thereof, and ascertain the fitness of candidates in respect to character, knowledge and ability for the branch of the service into which they seek to enter, and for this purpose he shall from time to time employ suitable persons to conduct such inquiries and make examinations, and shall prescribe their duties and establish regulations for the conduct of persons who may receive appointments in the said service. And the regulations so to be prescribed shall, among other things, provide and declare as in the second subdivision of the second section of this act, is provided and declared in reference to admission to the Civil Service of the State.

‘ Within two months after the passage of this act it shall be the duty of each of said mayors, in and by such regulations, to cause to be arranged in classes the several clerks and persons employed or being in the public service of the city of which he is mayor, and he shall include in one or more of said classes, so far as practicable for the purposes of the examination herein provided for, all subordinate clerks and officers in the public service of the said city, to whom his power, under this act, extends. * * *

“ It shall be the duty of all those in the official service of any such city to conform to and comply with any regulations made pursuant to this act, and to aid and facilitate in all proper ways the enforcement of all regulations and the holding of all examinations which may be required under the authority conferred by this section. But the authority by this section conferred shall not be so exercised as to take from any policeman or fireman any right or benefit conferred by law, or existing under any lawful regulation of the department in which he serves. And all examinations herein authorized shall be public, and all regulations shall be published, and with all the proceedings and papers connected with said examinations shall be at all times subject to the inspection of said commission and its agents; and said commission shall set forth in its reports the character and practical effects of such examinations, together with its views as to the improvement and extension of the same, and also copies of all regulations made under the authority hereby conferred.”

It is provided, however, in this same section that certain officers and their subordinates shall not be subject to these regulations. The officers and persons exempted from the provisions of this act are as follows: 1st. Officers elected by the people. 2d. The subordinates of such officer, for whose errors or violation of duty said officer is financially responsible. 3d. The head or heads of any department of the city government. 4th. Persons employed in, or who seek to enter, the public service under the educational departments of any city. 5th. Any subordinate officer who, by virtue of his office, has personal custody of public moneys or public securities for the safe-keeping of which the head of an office is under official bonds.

As to all these persons it is plain that the section is not to be applied; and, finally, the act, by its very terms, declares that no regulation shall be made “to contravene an existing statute relating to entrance to the said service.”

The Civil Service act, as I understand it, and the regulations to be made in pursuance thereof, by the mayors of the several cities of the State, were solely for the purpose of ascertaining and testing the fitness of persons desiring to enter the Civil Service of the several cities. It does not in any respect change the method of appointment, or affect the appointing power. The appointments are still to be made by the same power, and in the same manner as before the passage of the statute.

The law itself, and the regulations required to be made under it

was not intended to contravene any existing statute, but is supplementary thereto and in aid thereof.

The Legislature, in passing the act, empowered the mayors of cities, and made it their duty, to prescribe rules and regulations for the purpose of ascertaining and testing the fitness and efficiency of persons desiring to enter the public service under the municipal government; and, in my opinion, it is possible to do this, and to comply with the law, without in any way nullifying or contravening any existing statute relating to appointments in the city of Buffalo.

The Legislature has not attempted to hamper the executive of cities by prescribing the particular rules and regulations which he is to make; that matter is left to his own wisdom and discretion, but subject to the approval of the Civil Service Commission of the State. The mayor may appoint such examiners and agents and instruments as may seem to him best fitted to carry out the purpose of the law, namely, to ascertain and determine the moral character, capacity and fitness of persons desiring to enter the service of the city for the particular position or place for which he applies.

I have been unable to discover any practical difficulty in applying the principle of this law to the various departments of the city government of your city referred to in your communication.

First. As to the Police Department. By section 3, of chapter 436, of the Laws of 1880, as amended by chapter 359, of the Laws of 1883, it is provided: That the management and control of the Police Department of the city of Buffalo are vested in a board of commissioners, to be known and designated as the Board of Police of the city of Buffalo, and to be composed of the Mayor *ex officio*, and two other persons to be appointed by the Mayor; the members of such board are to be known as Commissioners of Police; and by section 8 of the same act, such board is empowered to appoint the police force; and by section 15, chapter 436, of the Laws of 1880, it is declared that: "The government and discipline of the Police Department shall be such as the Board of Police shall prescribe. And the said board are hereby empowered in their discretion to enact, adopt, modify and repeal, from time to time, rules and regulations for the management and administration of the said Police Department, and for the government and discipline of the police force, and of the subordinates under their control, in which shall be prescribed the mode of appointments to and removal from office, and in which shall also be defined the duties of the members of the police force. * * * The orders, rules and regulations authorized by this act, when duly made, enacted or adopted by the said board, shall have the same force and effect as if herein specially enacted, provided that the said rules and regulations shall not be in conflict with the provisions of this act, or with the laws of this State or of the United States."

The object of the Civil Service act, as I have already observed, was to establish a standard of qualification for a Civil Service position. Upon a comparison of the Civil Service act, and the statute

providing for the formation of the government of the Police Department of the city of Buffalo, I find nothing in either which conflicts with the other. There is no provision in the latter statute which prescribes what persons may be appointed to the police force of Buffalo. It cannot, therefore, be said that the Civil Service act contravenes, so far as entrance to office is concerned, any provision of the Police act of the city of Buffalo. All the various provisions of the Police act of your city may stand, have full force and effect, and be entirely consistent with the Civil Service act, which authorizes the Mayor to prescribe rules and regulations calculated to test the qualifications or special fitness of applicants for positions upon the force.

The Civil Service act does not attempt to prescribe regulations restricting the removal of appointees to Civil Service positions. It was evidently the policy of the Legislature to regulate appointments alone, on the theory that the regulation of appointments would, at the same time, go far toward preventing improper removals from office. It goes no further than to authorize the Mayor to prescribe rules and regulations which will provide a list of candidates from which appointments to the police force of the city of Buffalo must be made, under and in conformity with all laws and regulations now in force in said city.

These principles, and this reasoning, are, if any thing, more forcibly applicable to the matter of appointments to the Fire Department, the Water Department and the Board of Health of the city of Buffalo. The provisions of the statute relative to such boards are much less definite as to appointments than is that providing for the Police Department. It must be assumed that the Mayors of cities, in prescribing such regulations for the admission of persons under the Civil Service of their cities, as may best promote the efficiency thereof, will have due regard to the fact that special qualifications are required for service upon each of the various boards of the city, and that the principles and methods resorted to for ascertaining such qualifications will be suitable and efficient, in each particular case. No general competitive examination upon abstract questions would be considered a proper test of efficiency for special duties.

The qualifications of a good policeman must be widely different from those of an officer of the Board of Health, and, as a matter of course, the standard of qualification in each case must be widely different.

It is, therefore, my opinion, that the Civil Service act may be made applicable to the various departments of the city government of the city of Buffalo, in such manner as not in any wise to contravene or nullify any statutory provision, applicable to that city, and relating to entrance to the Civil Service thereof.

Very respectfully yours,

D. O'BRIEN,

Attorney-General.

APPENDIX E.

SPECIAL REPORT ON THE POLICE AND FIRE DEPARTMENTS.

The Civil Service of Cities. Police and Fire Departments. A Report to the Executive Committee of the N. Y. Civil Service Reform Association, Made at the request of the Civil Service Commission of the State.

On May 26, 1884, the Civil Service Commission passed the following resolution.

Resolved: That this Commission respectfully recommends to the Committee of the New York Civil-Service Reform Association on "Civil Service Examinations" the immediate examination of existing rules regulating appointments to the Police Force and also to the Fire Department of the City of New York, and also regulating the conduct of persons who receive appointments, with reference primarily:

1st: To the adaptation of those rules to competitive examinations, and what changes, if any, should be made for that purpose.

2d: To the sufficiency of those rules for ascertaining the physical, mental, moral, and special qualifications and fitness of applicants for those branches of the service, and what changes or additions, if any, appear to be desirable in that respect.

3d: To the adequacy of existing rules in respect to the conduct of persons in the service, specially with regard to vigilance, sobriety, courtesy, and discipline, and what changes can advantageously be made.

And further that the Committee report in full upon those points, with the reasons for their recommendations.

A true copy.

SILAS W. BURT,
Secretary pro tem.

THE CIVIL SERVICE OF CITIES.

The Committee on Examinations, in accordance with the above request, would respectfully submit, with the approval of the Executive Committee of the Civil Service Reform Association, the following report :

The Committee have made a careful examination of the rules and regulations, as, also, of the statutes governing the Police Department of the city of New York, the Fire Department of the same city, the police system of Brooklyn and that of Buffalo, and have had the advantage of consultation with officers thereof, as well as with a Committee of the Board of Underwriters of New York. In connection with the latter a sub-committee, consisting of Messrs. Stapler and Davison, have prepared the recommendations concerning the Fire Department, embodied herein.

The essential purpose of what are known as the reform laws of this State is to secure the best public service. To accomplish this the first step is to separate the service from politics in its administrative branches, and to make appointments and promotions therein for fitness only, practically tested. The specific means provided by the reform laws to carry out this purpose are open competitive examinations, wherever practicable, and probation. The appointments excepted from competitive examinations are such as are not likely to be controlled by improper influences, and, in great part, are surrounded by conditions that give substantial security for good selections. Chapter 410 of the Laws of 1884, passed May 29, require the Mayor of each city in this State to prescribe rules and regulations substantially the same as those previously prescribed for admission to the State Civil Service ; such rules and regulations are to take effect upon the approval of the New York Civil Service Commission ; the classification, by the Mayors of cities, of the persons employed in the public service of the city, which is the preparatory step to the application of the rules and regulations, is to be made within two months from the passage of the act, that is to say, by July 29 ; after the termination of three months, that is to say, after August 29, no one can be admitted to or promoted in the service thus classified : to be classified, "until he has passed an examination or is shown to be exempted from such examination in conformity with such regulations." The police and fire departments of the various cities, which were exempted from the operation of the law of 1883, are included in that of the law of 1884. This extension of the field of reform

the entire municipal service of the State, and especially to the police and fire departments, is of the greatest importance. It is undoubtedly surrounded by difficulties. Not any of these, however, are insurmountable, and we are fortunate in having strong evidence in what has already been done, that the principle of the reform is practically efficient in overcoming them.

In the police force it is plain that the public ought to have the very best service, and equally so that the chief obstacles to that end have, in our large cities, arisen from the interference of politics with the requirements of the service. A careful examination of the statutes governing the Police Department of the city of New York, and of the rules and regulations adopted by the Commissioners, will show that, with the exception of the faulty composition of the Commission with its four members, a system is provided for, which is admirable in its general features, and capable of being made highly efficient. Not only the tenure for good behavior of the members of the force, its general organization, and the standard of conduct required by the rules, but the declared conditions of appointment and promotion, the discipline demanded, and the details of administration as they appear in the rules, leave little to be desired. The defects in practice, which are well known, arise from the influence of partisan politics, which in no branch of the service is more mischievous. The device of a Commission of four members, to be equally divided between the two principal rival parties, has increased, instead of preventing, the evils from this source. The facts are too familiar to require recital. It is now generally admitted that in this respect the force is nearly every thing that it ought not to be. The system put into full operation by the law of 1884 has for its specific purposes the emancipation of the force, as far as practicable, from politics. The Commission is left untouched; but the reform system proposes to make the conditions of appointment and promotion such that, honestly and intelligently enforced, they will shut out politics, and secure the best attainable men at the entrance to the service, and give them the strongest inducements for zealous efforts to excel at every stage thereof. This, the chief end of the system, should be kept steadily in view at each step in its application. Not the least valuable of the results that may be expected is that, if the system be thoroughly and successfully applied, the Commissioners will themselves be freed from the demoralization that has been heretofore witnessed, and will feel a keener sense of responsibility for the real excellence of the force, and a wholesome pride in its more efficient conduct. •

The peculiar and important powers intrusted to the police force are liable to corresponding abuse. It has great influence direct and indirect upon elections, upon the exercise of the suffrage, the purity and independence of which are absolutely necessary to the even tolerable working of our municipal system. The supervision and regulation of the disorderly or criminal classes; the practical administra-

tion of the laws governing the liquor traffic, with its manifold dangers to the peace and order of the city; the discretion which, in fact if not in law, exists with reference to the suppression of gambling, and of that most insidious and widespread evil, prostitution in its various forms and grades; these are sources of possible abuses in the police force of the gravest degree, and of a kind that can only be guarded against by the most careful and exacting system of selection of its members. It no longer admits of argument that the essential principle of this system must be open competition. This proposition, irresistibly enforced by a candid examination of the conditions of the problem, is reinforced by the results of experience. Disregarding the history of the police of London, which is extremely instructive on this point, we have, in the results of open competition under the law of 1883, in Brooklyn and in Buffalo, ample evidence that it is capable of accomplishing all that is expected of it. It excludes political favoritism, and provides security for the equal and common right of all citizens, who desire to do so, to obtain entrance to the service in the ratio of their fitness for it. It gives to the public the greatest facility for securing the best men. It makes the public familiar with the qualifications of the force, and greatly increases public confidence in its independence, fidelity, and trustworthiness. It awakens in the force itself, from the start, a strenuous emulation for excellence; and when applied, as it must be, to promotions as well, it gives well-grounded hope of advancement for merit and merit only, establishes on a firm basis the self-respect of the men and their respect for the force to which they belong, and thus aids powerfully and directly in the maintenance of discipline and efficiency.

The general method of applying the principle of open competition is embraced in the following suggestions, which are in great part based upon the Regulations of the Police Departments of Brooklyn and Buffalo, with some modifications and additions designed to meet more fully the requirements of the service.

All applications for appointment to any position in the Department shall be made upon blanks furnished by the Department. The first of these, to be presented by the applicant in person, should be substantially as follows:

City of 188 .

To the Commissioners of Police:

The undersigned states that he is years of age, respectfully asks an appointment as in the Police Department, city of , and refers you to the following testimonials.

Signed,

Each of the undersigned respectfully represents to the Commissioners of Police, city of , that he can and does hereby testify that he knows the above applicant personally, and that he

a man of good moral character, of sober and industrious habits, that he has never known him to be guilty of or convicted for any criminal or disorderly conduct or act, and each of the undersigned further says that he consents that this certificate may be made public.

Name. Residence.

The second, which should be required to be filled out and signed in the presence of an officer of the Police Department who should also sign as witness, should be substantially as follows :

(N. B. This statement of applicant must be filled out and signed in the presence of an officer of the Police Department, who will also sign as witness.)

City of.....188 .

Statement of

Where were you born?
In what year?.....Month?.....Day?
Where do you live? (street and number).....
How long have you lived in ... ?
If not born in the United States, have you been naturalized? ..
When? Where?
Are you married or single or widower?
What family have you?
Have you been convicted of any crime?
What is your regular occupation?
What was your last occupation?
Have you ever been a policeman?
If so, where?And when?
Have you paid, or promised to pay, or given any money or other consideration, to any person, directly or indirectly, for any aid or influence toward procuring your appointment?
(a) Have you been in the army or navy of the U. S.?
If so, when?In what capacity?
Witness,

Signature of Applicant.

Police Department of the City ofss.
..... being duly sworn, both depose and say,

I signed the above statement, and the same is true to the best of my knowledge and belief.

Sworn to before me this .. day }
 of 18 } *Signature of Applicant.

.....

*Signature of Officer administering Oath.

(a) If the applicant has been in the military or naval service of the United States he should furnish the name and address of one or more of his surviving officers, if practicable; in any case he should give satisfactory evidence of honorable discharge.

These blanks, properly filled out, with the testimonials attached to the first, will afford the basis of investigation as to the character of the applicants, which should be made as thorough as possible. On this point it is to be remarked, in the first place, that competitive examination cannot in itself completely test the character of applicants, and must not be relied upon to do so, but as under the laws of this State and the Rules of the Civil Service Commission, each appointment is to be made from among the highest, and not of the single one standing highest, on the eligible list, there is left, as there should be, scope for the responsible discretion of the appointing power.

And in the second place, there is under this system every means left open for ascertaining character that can be properly or usefully employed under any other system. In Buffalo the following rule is adopted: "General character, to include habits and reputation, is to be ascertained in such manner as the Examining Board may determine." In Brooklyn the Captain of the Precinct in which the applicant resides is required to "make diligent and confidential inquiry concerning" him, and the Commissioner avails himself of such other sources of information as he can, especially of direct and explicit inquiry from the signers of the applicant's testimonials, and this in no case should be omitted. But the specific methods to be applied in this matter must be left to the mayor of each city to determine.

The next step in the system is the physical examination of applicants, which is of the highest importance. In this it is considered possible to secure a more practical test of fitness for the service than has yet been attained, even under the most improved methods. The surgeons should, as of course, obtain accurate information as to the points covered by the following questions:

APPLICANT'S STATEMENT.

Name
 Date of birth
 Occupation

Have you any disease now?
What diseases have you had during the last seven years?
.....
Do you know of any hereditary disease in your family?
If your parents, brothers, or sisters, or any of them, are dead, of
 what disease did they die?
Have you ever had fits?
Have you ever had any fracture or dislocation?
Have you ever received any injury to the head or spine?
Are you subject to piles?
Have you been vaccinated?
Have you ever had rheumatism?

.....Applicant.

Name.....Age.....Residence.....

HAS THE APPLICANT ever been examined by the Medical Officer of the Department, and if so, state the result?

WEIGHT.	HEIGHT.		C.† At forced Expiration.....inches On full Inspiration... ..“
	A.	B. Feet. Inches.	

A. IS THE RESPIRING MURMUR clear and distinct over both lungs?	A.
B. Is the character of the Respiration Full, Easy, and Regular?	B.
C. Are there any indications of Disease of the Organs of Respiration or their Appendages?	C.

A. IS THE CHARACTER of the Heart's action Uniform, Free and Steady?	A.
B. Are its Sounds and Rhythm Regular and Normal?	B.
C. Are there any indications of Disease of this Organ or of the Blood Vessels?	C.

A. IS THE SIGHT GOOD?	A.
B. Is the hearing good?	B.

IS THE APPLICANT SUBJECT TO COUGH, Expectorations, Difficulty of Breathing, or Palpitation?

A. ARE THE FUNCTIONS of the Brain and Nervous System in a Healthy State?	A.
B. Has the Brain or Spinal Cord ever been diseased?	B.

IF THE APPLICANT has had any serious illness or injury, state expressly what effect, if any, is perceptible in the heart, lungs, kidneys or other abdominal organs, or the skin, eyes, ears, limbs, etc.

HAS THE APPLICANT any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula, rheumatism?

DOES THE APPLICANT display any evidence of having or having had syphilis?

HABITS, use of stimulants and tobacco.

* The Examiners are called upon to pay especial attention to the annexed schedule in determining the fitness of the applicant.	† Minimum circumference of the Chest tolerable in applicants			‡ STATURE AND WEIGHT —The stature shall not be below 5 ft 7 in., nor the weight below that marked as its minimum accompaniment in the subjoined table.*	
	Height. Feet. Inches.	Circumference of Chest. Inches.	Height. Feet. Inches.	Min. Weight. Pounds.	
† There should be a difference, at least, of two inches at forced expiration and on full inspiration.	6	7	5	135	
	6	8	5	140	
* * Obesity must be regarded as a good cause for rejection, whenever it exists to the extent of interfering with the activity and usefulness demanded under emergencies.	6	9	5	145	
	6	10	5	150	
‡ Syphilitic taint in the applicant must always be regarded as good cause of rejection.	6	11	5	155	
	6	—	5	160	
	6	1	6	165	
	6	2	6	170	
	6	3	6	175	
	6	4	6	180	

(a) In examining the sense of sight, it is desirable, not only that the general condition of the organs should be ascertained, but that weight should be given to quickness and accuracy in discriminating colors and distances. The hearing should be tested also as to keenness and correctness in distinguishing degrees and kinds of sounds and the direction from which they come.

REMARKS.....

I.....being duly sworn, depose and say, that I have returned true answers to the inquiries of.....touching my personal and family health, history, habits, and antecedents; and that I am the person described in the above record of examination.
Sworn to and subscribed before me, this.....day }
of.....188.....Notary Public.

I HEREBY CERTIFY that.....have this day carefully examined.....and find that he is.....sound in limb and has.....good eyesight and.....good hearing, and in.....opinion is.....perform the duties ofand that the above is a true and correct statement of the facts.
Signed.....
New York,.....188.....

It is to be borne clearly in mind that, on the one hand, the physical examination should be directed to testing the applicant's condition and capacity for good service rather than to any special acquirements, and, on the other, this test should be made as complete and conclusive as possible.

In addition to this system of examination, which is substantially that now prescribed in New York, there has been developed, largely by the intelligent labors of Prof. D. A. Sargent of the Hemenway Gymnasium of Harvard University, a simple, practical, and scientific system, which brings out clearly the general physical capacity of the man examined, together with his special points of superiority or deficiency. The direct examination consists of a series of body measurements, taken after a uniform plan, and a corresponding test of the strength of each of the parts measured, as nearly as possible. The strength of lungs, back, chest, legs and arms, is taken by means of ingenious, but simple, spirometers and dynamometers, made for the purpose and carefully adjusted. The sums of the tests for strength are then compared with the sums of the measurements of development of the corresponding parts. What a man can do is thus contrasted with what he ought to be able to do, and the ratio between the two fixes his relative standing. The measurements which would be practically sufficient in the case of applicants for the police force are: Height, standing and sitting; girth of the head, of the chest in repose and expanded, of the waist, of the right and left thigh, of the right and left upper arm and forearm; the depth of the chest, and the stretch of the arms. The tests of strength and capacity required should include the capacity of the lungs, the strength of the lungs, and the strength of back, chest, legs, upper arm, and forearm. In addition to the information thus gained, the surgeons should ascertain the applicant's power to handle his own weight, in running, and in pulling up or pushing up his weight.

The system above outlined, though more thorough than any yet enforced, is not difficult of application, and has been so widely and carefully tested, not only at Harvard but elsewhere, that the value of the knowledge obtained of an applicant's capacity for good physical service and for endurance is established. Its use in the police force would not only secure men of superior strength, quickness, and physical efficiency, but men of sounder health, less liable to fall upon the sick list, or to incur risk of accident or injury, or to become a charge upon the pension list.

It is greatly to be desired, however, that any system of examination for admission to the service of the police should be followed by a course of training which should furnish a further test of qualification, and should be in the nature of probation. In the city of New York this could be practically established under Rule 116 of the Commissioners, which provides for dismissal of any member of the force for "incapacity — mental, physical or educational." While "dismissal" at present is a form of punishment, to be preceded by conviction, it would be easy to provide a term of training

and trial, at the close of which the applicant could be dropped without the discredit of punishment. During such a term it would be practicable to ascertain special fitness for the peculiar work of the force — the command, for instance, of the man over his own nerves and muscles, the quickness and correctness with which he could seize and follow the sense of an order, his power of sustained attention and alertness, his coolness and general self-control. In this school also, the exercises of running and swimming, and the use of fire-arms, all demanded in the force of New York, could be required, and essential failure to show adaptation for them would be sound reason for rejecting the man under trial. The knowledge of the applicant's fitness for service thus gained would be very valuable, and could not be fairly got from any preliminary examination. The results of the physical examination should be classified, and a proper weight assigned to each class; the sum of the weights should be 10. Each should be marked on a scale of 100 (representing the maximum), and the average should be got by multiplying the standing of the applicant in each qualification by the value of said qualification, and dividing the united products by 10.

With the understanding that all applicants must attain a standing of at least 50 in each division of physical examination, and an average standing of 70 on all, measured on a scale of 100, their actual standing in physical qualifications should enter into the generating of their fitness for appointment. They should then be submitted to further examination as to general qualifications, substantially as follows:

GENERAL QUALIFICATIONS.

1. General character: To include habits and reputation, and to be ascertained in such manner as the examining board may determine.

2. Experience: Obtained either in actual service as a police officer or in other occupation tending to qualify for such service.

3. Obligatory subjects:

a. Reading from print and manuscript.

b. Handwriting, as shown by copying from manuscript.

c. Writing from dictation.

d. Spelling, as shown in writing from dictation.

e. Arithmetic: Addition, subtraction, multiplication and division, applied to whole numbers.

f. Police rules and regulations.

g. Questions relating to city government, location of streets, etc.

The relative weight given to the several obligatory subjects in making up the average standings will be as follows:

a. Reading	2
b. Handwriting	2
c. Writing from dictation.....	1
d. Spelling	1

e. Arithmetic.....	1
f. Police rules and regulations.....	2
g. City data.....	1

Total of weight..... 10

In making up the general average of the standing of the applicant, the relative value of each qualification and subject will be as follows:

Physical qualifications.....	40
General character.....	15
Experience.....	10
Obligatory subjects.....	35

Total of values..... 100

The general average will be ascertained by multiplying the ascertained average standing of the applicant in each qualification by the value attached thereto, and dividing the united products by the sum of the values, 100.

No person whose standing on any of the qualifications or obligatory subjects enumerated above is less than 50, or whose ascertained average on all is below 70, to be entered on the eligible list.

Under the head of "Police Rules and Regulations," it is practicable to test with considerable accuracy and to the great advantage of the service, the natural or acquired fitness of the applicants for their work. They should be given a reasonable time before the examination, a copy of selected rules and regulations covering the more important branches of their future duty. Cases should be described to them—preferably actual cases taken from correct reports, readily accessible in the press—and they should be required to state their view of what the rules would require of them in such cases. This inquiry should include a report, such as a policeman would be obliged to make, of such an occurrence. While this test would necessarily give only indications of the aptitude of the applicant, these indications would be of the greatest value, and, as all applicants would be subject to the same conditions, the relative fitness of each would be clearly attested.

For appointments in the police department of clerical duty, the principle of open competition should be applied in the same manner as is now prescribed for clerical appointments to the Civil Service of the State. For appointments as "doorman" a simpler examination should be used, but the principle of open competition should be strictly adhered to, and the rules should explicitly provide that promotions from this grade to that of patrolman should not be made. The rules should state that "any false statement knowingly made by any person in his application, and any connivance by him in any false statement made in any certificate which may accompany his application, or willful complicity in any fraud designed to improve his standing upon examination shall be regarded as imperative cause

for the final rejection of such application," or for "his dismissal, if discovered after his appointment." It should be called, further, to the attention of applicants, that false statements willfully and corruptly made by any person concerning the standing of an applicant under the Civil Service acts are an offense against the law, and are punishable in the courts. It should also be stated in the rules and regulations, and brought clearly to the knowledge of applicants, that "neither the political opinions, party affiliations, nor the party services of an applicant shall be considered by any examining board; nor shall such opinions, affiliations, or services be drawn to the attention of any examining board, or any of its members, by any person," and that "any violation of this rule by any applicant, or with his consent or acquiescence, shall be imperative cause for the rejection of such applicant, or for dismissal, if subsequently discovered." On these points there should be no room for mistake or misapprehension. Every one interested should be made to understand that political influence will not help, but will hopelessly defeat, the applicant. This goes to the vital principle of the whole system and should be unflinchingly enforced.

Promotions within the police force should be made exclusively from the next lower grade by competitive examination, that is, to the post of roundsman from the patrolmen, to sergeant from roundsmen, to captain from sergeants, to inspectors from captains, and to superintendent from inspectors. This is required not only because the knowledge, training, and experience of each grade furnish the best qualifications for the higher grade, but because the fact that promotion along the whole line depends on proven superiority in each grade will be the strongest possible incentive to the attainment of such superiority. It is possible, though not probable, that in rare instances a better man for certain positions may be had from outside the service, or from a grade lower than the next, but any inconvenience that might arise from this source would be much more than offset by the wholesome and powerful influence of rigid adherence to the principle of regular advancement. In examinations for promotion, the tests of general intelligence should be subordinated to the tests supplied by examination as to the special qualities, and by the record of the applicants. The annexed blank used by Col. John N. Partridge, commissioner of police in Brooklyn, with reference to promotions for roundsmen and sergeants is submitted.

ON THE EXAMINATION OF

.....
for promotion to.....in the
Police Department.

.....188..

N. B. — In examining Roundsmen for promotion omit No. 6.

“ “ Patrolmen “ “ “ Nos. 14 and 15.

(*Highest possible marking on any subject, 100)

	MARKS.
1. Writing from dictation.....
2. Handwriting.....
3. Spelling.....
4. Knowledge of the "Rules and Regulations".....
5. Fines and penalties last years.....
6. Arrests for last 12 months.....
7. Veracity.....
8. Habits as to use of liquor.....
9. Ability and energy.....
10. Coolness and judgment in emergencies.....
11. Deportment towards citizens.....
12. Language (profane or vulgar).....
13. Physique and endurance.....
14. Character for maintaining discipline among, and get- ting good work from, patrolmen.....
15. Knowledge of laws and ordinances relating to police duties.....
AVERAGE.....

Remarks.....

 }
 } **EXAMINERS.**
 }

It may be remarked that, in the matter of "arrests" by patrolmen applying for the post of roundsman, the nature of the arrests and the final disposition made of prisoners are considered carefully, as well as the mere number.

In the city of New York, certain special duties are assigned to the "Sanitary Company," who are not only charged with supervision and regulation of matters likely to be dangerous to health or life,

but also with the examination of engineers of steam boilers. For these duties it is clear that there should be a special examination.

In regard to the Fire Department, a careful examination of the existing rules of the department shows that the application of the principle of competitive examination to admissions to the uniformed force will further increase the efficiency of a department which presents in its present organization much that is admirable and worthy of high commendation. Under existing rules, there is an opportunity for admissions to the force being kept entirely under the control of political influence. It is highly desirable that this should be changed by placing all applicants in the same position before an examining board, admissions to the force to be governed solely by the test of a competitive examination upon those subjects most likely to show the fitness for the service in the force. The duties to be performed by a member of the uniformed force of the Fire Department are such as call for the possession of physical soundness, strength, agility, nerve, and general intelligence. The examinations should, as far as possible, be such as to show the relative merit of the applicant in the particulars named; good character, of course, should be regarded as a necessary condition to employment in the service; great care should be exercised in this particular, since the presence of men in the force whose characters are not reputable would greatly tend to demoralization and inefficiency. Under the existing regulations of the Fire Department, the entire active force is known as the uniformed force, and is composed of officers and privates. The privates are graded into three classes, first, second, and third. A new appointee to the force takes his place in the third class at a salary of \$800; service of two years entitles him to pass the second class and to receive the salary of \$900; and a service of four years to enter the first class at the salary of \$1,000. There is also connected with the department a school known as a school of instruction, which all applicants for admission to the uniformed force, after having passed the requisite surgical examination, are obliged to attend for ten days on probation, at the end of which time the instructor for the school of instruction reports to the Commissioners whether the applicant is competent to become a member of the force, and further whether he is or is not qualified to become a member of the life-saving corps, the life-saving corps being composed of those who show a special fitness for performing the more dangerous duties incident to the employment of a fireman. If the report is favorable to the applicant, he receives an appointment and is required to pass an additional ten days in the school of instruction before entering upon his active employment in the force. If his stay in the school of instruction shows that he is fitted to become a member of the life-saving corps above referred to, he is assigned to duty as a member of such corps. The rule requiring a candidate to serve a probationary period in the school of instruction is an admirable one, and, if properly enforced, may be made one of the best methods of determining a candidate's fitness for admission to the force, but it is clearly

requisite that the opportunity of admission to the school of instruction be open to all applicants who possess the moral, physical, and mental qualifications; so that such admission should not be confined solely to those who bring such political influence to bear upon the Board of Commissioners as to force a recognition of the applicant's claims.

The forms and rules as to applications may be the same as are suggested for the Police Department.

While the methods of physical examination already in use in the Fire Department are thorough, and appear to be more than usually well adapted to the purpose, the recommendations made with regard to the Police Department apply in this case as well, and the methods therein proposed are urged strongly for the Fire Department. It will be understood that in the period of probation and training the exercises required will be different, and such as are adapted to the fire service. The remaining examinations should be modeled on those suggested for the police. They need not, however, embrace any questions as to the city government, and, in that part relating to the rules and regulations of the department which the applicant seeks to enter, there should be a test of the applicant's readiness in making such reports of occurrences at fires and in the stations of the fire companies as are required in the service. These may be made either in writing or orally. If orally, the report should be taken down by a stenographer, in order that there shall be a trustworthy record for reference and preservation. In making up the general average of the standing of the applicants, the following relative values are recommended, in place of those suggested for the police:

Physical qualifications.....	33
General character.....	15
Experience.....	24
Obligatory subjects.....	28

100

It is recommended that the boards of examiners, to be appointed by the mayor, to whom shall be referred all applications for admission to either department, shall be made up in a manner to carefully avoid any fair implication of political partiality. With reference to the Fire Department, it is strongly urged that the examiners be chosen from, or on consultation with, the Board of Underwriters.

The question of promotion in the Fire Department is an important one. While the principle of competition should undoubtedly be observed, it should be applied with great care with the purpose of giving full weight to the conduct of the applicants in the service. For this purpose a record as accurate as possible should be kept of each man's conduct and actions, and the examiners for promotion should be instructed to take into consideration all the circumstances showing capacity, as to physical qualities or as to courage, devotion

and fidelity. Such questions as refer to reading, writing, and knowledge of the simpler forms of arithmetic should be strictly limited to testing general intelligence; and, in rating the value of the answers, the answers to these should be subordinated in a marked manner to the evidence afforded of the applicant's efficiency in actual work. It should be clearly borne in mind that competition is not confined to answering questions, and that it is simply testing the relative fitness of all applicants in the most practical and conclusive manner. For promotion the service itself is the most valuable method of competition, and its results, intelligently ascertained and weighed, should determine the action of the appointing power.

In making appointments either for admission or promotion, the appointing power should select from the five persons standing highest on the competitive examinations.

It is desirable that the rules governing admissions to both the Police and the Fire Departments, together with the rules governing the conduct of the force, should be prepared in pamphlet form, for free distribution, on application at the proper offices. The fullest practicable publicity is at once the right of citizens and an advantage to the department.

In submitting these recommendations the committee would call attention to the fact that, while the principle of open competition, on which they rest, is now made mandatory in the law of the State, and is amply sustained by experience in this State, in a number of our cities in the Federal service and in the Civil Service of Great Britain, its application to the various branches of the municipal service must depend on special requirements, and must be modified and perfected as those requirements become known in practice.

EDWARD CARY,
CHAS. A. DAVISON,
E. L. GODKIN,
CARL SCHURZ,
H. B. B. STAPLER.

APPENDIX F.

COPIES OF CITY REGULATIONS.

CITY OF NEW YORK,
MAYOR'S OFFICE, *August 22, 1884.* }

In the exercise of the authority conferred upon the mayors of cities by chapter 410 of the Laws of the State of New York for 1884, passed May 29, 1884, the following regulation for the admission of persons into the Civil Service of the city of New York, and for the conduct of persons who may receive appointments in the said service, are hereby prescribed and established to take effect on the twenty-ninth day of August, in the year of our Lord one thousand eight hundred and eighty-four.

FRANKLIN EDSON,
Mayor.

NEW YORK CITY CIVIL SERVICE REGULATIONS.

Regulation 1.

These regulations shall apply to all positions in the service of the city of New York, with the following exceptions, namely: "Officers elected by the people, and the subordinates of any such officer, for whose errors or violation of duty such officer is financially responsible, and the head or heads of any department of the city government, and persons employed in, or who seek to enter the public service under the authority of the board of education, and any subordinate officer, who by virtue of his office has personal custody of public moneys or public securities, for the safe keeping of which the head of an office is under official bonds."

Regulation 2.

Schedule A shall include all deputies of officers and commissioners duly authorized to act for their principals, and all persons necessarily occupying a strictly confidential position.

Schedule B shall include clerks, copyists, recorders, book-keepers and others rendering clerical services.

Schedule C shall include policemen, both in the police department and department of parks, and the uniformed force in the fire department.

Schedule D shall include all persons for whose duty special expert knowledge is required not included in Schedule E.

Schedule E shall include physicians, chemists, nurses, orderlies and attendants in the city hospitals and asylums.

Schedule F shall include all persons not included in the foregoing schedules, and not laborers or day workmen.

Schedule G shall include all persons employed as laborers or day workmen.

Each schedule shall also include the persons specified under that head in the classification hereto annexed, marked Appendix A.

Regulation 3.

For the purpose of ascertaining the qualifications of persons seeking or named for positions in the departments and offices of the municipal government, there shall be a board of examiners for all positions in Schedules B, C, D, E and F.

This board shall be composed of six citizens designated by the mayor and of the secretary of the boards.

The secretary shall be chairman. The mayor may at any time substitute another citizen in the place of any one so designated, and the members of such board shall receive compensation only for the time when actually occupied in the performance of their duties as examiners, as shown by the minutes of such board. The mayor will employ a suitable person who shall act as the secretary and executive officer of the examining board and of the supervisory board. The rate of compensation of the members of such board and of the secretary shall be fixed by the mayor who will employ assistance, procure suitable officers, and incur such other expenses as may be required for the efficient performance of the duties imposed upon him by the eighth section of chapter 354, of the Laws of the State of New York for the year 1883, as amended by chapter 410 of the Laws of the said State for the year 1884.

It shall be the duty of such board of examiners by such of its members as it shall designate, to conduct all examinations called for under these regulations, except as herein otherwise provided, and to ascertain the fitness of candidates for the service of the city, with regard to character, knowledge and ability for the branch of the service into which they seek to enter, and to determine the relative excellence or standing of the persons examined, and to certify the same as herein prescribed.

The secretary of the boards shall keep minutes of all their proceedings, and all necessary records of the examination, standing and certification of applicants, and a complete record of all persons employed in the several departments to which these regulations apply, and of all appointments, promotions, dismissals, resignations and other changes of any kind therein. When not in attendance upon the boards, the secretary shall act under the direction of the mayor.

In addition to the board of examiners hereinbefore prescribed, there shall be a supervisory board to be composed of three citizens, designated by the mayor, whose duty it shall be:

FIRST—To aid the mayor, at his request, in preparing suitable regulations for the carrying into effect the provisions of said act.

SECOND—To conduct such inquiries as it may deem expedient respecting the examinations in these regulations provided for; to control such examinations and the general administration of the system created by these regulations, and to decide from time to time, subject to revision by the mayor, all questions arising under these regulations or the construction thereof, and to make an annual report to the mayor, showing its own action, the regulations and the exceptions thereto in force, the administration thereof with such suggestions as it may deem necessary for the more effectual accomplishment of the purposes of the said section and of said regulations.

The vouchers for the pay-rolls and all other expenses incurred in carrying these regulations into effect shall be certified by the secretary to the mayor.

Regulation 4.

Appointments to positions in Schedule A may be made without examination; but the appointing officer shall file with the secretary, within five days after making any such appointment, a formal notification thereof, setting forth the full name of the appointee, the date and place of his birth, length of his residence in the city of New York, nature of previous employment, whether he has ever been in official service before, and if so, when and where; the date of beginning of such service and term for which appointed, salary, name of person in whose

place appointed, and such other statistical information as the advisory board may deem proper for registration.

Regulation 5.

Vacancies in Schedules B, C, D, E and F, not filled by promotion, shall be filled by selection from those who have passed highest in open competitive examinations, subject to the conditions herein expressed, except as hereinafter provided.

Regulation 6.

Applications of competitors for positions included in Schedules B, D, E and F must be addressed to the "Secretary of the Municipal Service Boards, New York city," and must be accompanied with the following papers:

FIRST — The affidavit of the applicant showing that he is eighteen years of age, and a citizen of the United States, giving his place of residence, with the street and number thereof, if any; the place, nature and extent of his education, and of his business training and experience, and stating whether he has ever been in the Civil Service of the city of New York, or in the military or naval service of the United States, and if so, when and where.

SECOND — A list of the optional subjects upon which he desires to be examined, if any; and a statement whether such application is limited to any particular office or offices in the service.

THIRD — The certificate of not less than three nor more than five reputable citizens of the city of New York, that they have been personally acquainted with the applicant for at least one year, and believe him to be of good moral character, of temperate and industrious habits, and in all respects fit for the service he wishes to enter, and that each of them is willing that such certificate should be published for public information, and will, upon request, give such further information concerning the applicant as he may possess.

In case the applicant reside out of New York city, two of the citizens making such certificate may be residents of the same place.

The requirements as to citizenship and certificates of character may, in case of persons applying for positions under Schedules E and F, be modified or dispensed with in the discretion of the supervisory board.

Registers of all applicants shall be kept by the secretary of the boards. When the applicants on a register are in excess of such number as can be conveniently examined on the same day, the applicants shall be notified to appear in their order on the register. Whenever the demands of the service may require, the proper board of examiners shall direct the secretary to notify the applicants of record, or such number thereof as can conveniently be examined, to appear for examination, giving place, date and hour for such examination.

Regulation 7.

Applicants for the following positions must, before being admitted to examination, present satisfactory evidence as to the following facts:

FIRST — If the position to be filled be that of physician, surgeon, chief of staff of hospital, medical officer, medical superintendent, inspector of vaccination, or sanitary inspector, that the applicant is duly authorized by the laws of the State of New York to practice medicine and surgery.

SECOND — If the position to be filled be that of chemist or analyzer, that the applicant has received the degree of bachelor of sciences, or its equivalent, from some institution duly authorized by law to confer such degree.

Regulation 8.

In positions where the duties are professional, technical or expert, the candidates will be required to show what preliminary training or technical education they have undergone to qualify them for such situations before they can be admitted to examination.

Regulation 9.**SCHEDULE B.**

The general examination for admission to positions in Schedule B shall be in writing, and on the following subjects :

Obligatory :

1. Handwriting (as shown in next subject).
2. Writing from dictation.
3. English spelling (as shown in previous subjects).
4. Arithmetic, viz. : addition, subtraction, multiplication and division — as applied to whole numbers and fractions.
5. Making a condensed summary of a document.
6. Information relating to the city of New York and its government.

Optional :

7. Copying from manuscript and indexing.
8. Arithmetic applied, viz. : Practical problems in proportion, percentage, interest, discount and average.
9. Letter writing on subjects connected with New York city affairs ; grammatical correctness, clearness and brevity of expression will be considered.
10. Book-keeping.
11. Expert penmanship.
12. Type writing.
13. Stenography.

Every applicant must be examined in the six obligatory subjects, and may be examined further in such of the optional subjects as he may select.

Regulation 10.

The relative weight given to the several obligatory subjects in making up the average standings in Schedule B shall be as follows :

1. Handwriting.....	30
2. Writing from dictation.....	15
3. English spelling	10
4. Arithmetic.....	20
5. Making a summary.....	15
6. New York city information.....	10
Total of weights.....	100

Regulation 11.

In all examinations each subject shall be marked upon a scale of 100, which number represents the maximum possible attainment.

Regulation 12.

The process of ascertaining the absolute standing of each competitor shall be as follows :

SCHEDULE B.

New York City Municipal Service, {
June 30, 1885.

RESULT OF EXAMINATION OF ADAM ROBERTS.

Subjects.	Standing on subject.	Weight given to subject.	Product of stand- ing and weight.
1. Handwriting.....	83	30	2490
2. Writing from dictation.....	90	15	1350
3. English spelling.....	68	10	680
4. Arithmetic... ..	72	20	1440
5. Making a summary.....	70	15	1050
6. New York city information... ..	59	10	590
Total product .....	..	..	7600
Divide product by sum of weights or general average standing.....	..	100	..
	..	..	76
8. Letter writing .....	..	..	85

The standing of each of the optional subjects in which any competitor is examined shall be marked on a scale of 100, and shall be recorded in the preceding form as there shown. A similar form shall be used in stating the result of examination for appointment to positions under Schedules C, D, E and F.

Regulation 13.

ELIGIBLE LIST.

An eligible list shall be prepared by the secretary, from time to time, as the needs of the service require, for each of the different grades of every class in Schedules B, C, D, E and F. Upon each eligible list shall be placed only such persons as have been found by the examining board to be duly qualified for the positions for which such eligible list is prepared. The candidates shall be placed upon the eligible list, stating the order of merit, as shown by the respective percentages of their aggregate markings upon their examinations, excepting that where the candidate has been honorably discharged from the military or naval service of the United States in the late war, he shall be preferred over other candidates equal in rating with himself. Where an examination for any grade takes place before the eligible list for that grade is exhausted, a new eligible list shall be prepared after such examination, to take the place of the former eligible list. The persons upon the former eligible list who have not been examined for the new eligible list shall, unless a period of two years from the date of their original examination has elapsed, be placed respectively upon the new eligible list in the position to which the percentages of their aggregate markings upon their former examinations would entitle them if such markings had instead been given them upon the new examination.

Regulation 14.

The actual conduct of every examination shall be under the responsible direction of the board of examiners, or of its designated members, free from the interference or participation or influence of the appointing officer, or of any person other than the supervisory board, the secretary, assistant examiners or experts directly employed by the board of examiners or by the supervisory board. The supervisory board shall have power to authorize or order the employment

of an expert to assist any board of examiners, whether in a special case or in connection with the examination for any special grade, position or office. The selection of such expert shall be made by the board of examiners, with the consent and approval of the advisory board. All examinations shall relate to such matters as will fairly test the relative capacity and fitness of the persons examined to discharge the duties of that service to which they seek to be appointed. Excepting as these regulations otherwise provide, the board of examiners may, in the examinations, give such relative importance to the different subjects or matters of examination as to them may seem fit. Any applicant receiving less than a minimum general rating of seventy per cent shall not be placed upon the eligible list. At or before the commencement of every examination, the weight to be given to every subject included in the examination and the minimum, if any, allowable upon each subject, shall be announced to the applicants. The appointing officer shall state to the supervisory board, upon its request, the general qualifications or attainments, physical or mental, or both, and the experience he deems necessary or proper in the position for which an eligible list is to be formed, and also within what limits of age the persons on such list should be.

Regulation 15.

The aggregate results of each examination shall be entered in form as follows upon a

REGISTER OF ELIGIBLE CANDIDATES.

Relative general standing.	Name of competitors.	General, or on ob- ligatory subjects.	Absolute standings on optional subjects.			
1	Charles O'Malley	89	80	70	..	79
2	Peter Davis	87	..	84	78	..
3	Carl Schmidt	86	..	..	..	87
4	David Thompson	83	87	88	71	73
5	James Brown	83	89	..	..	83
6	Terence Murphy	82	82	90	87	74
7	Edward Green	81	94	..	85	81
8	Richard Roe	80	..	..	..	..
9	Max Adler	80	78	..	..	86
10	Adam Roberts	70	..	85	..	..

Regulation 16.

APPOINTMENTS.

Whenever a vacancy shall occur within any grade of any class in Schedules B, C, D, E and F, which, in the opinion of the appointing officer, the business of the city requires to be filled, and which, under these regulations, the appointing officer cannot himself fill by promotion, he shall notify the secretary of the vacancy, and shall state whether the position to be filled is a minor clerkship, or whether any of the special qualifications denoted by the optional subjects are essential, and if so, which. The secretary thereupon shall, as soon as practicable, certify to the appointing officer for appointment from the eligible list appropriate to such position as it may then exist, the three persons having the highest standing on such eligible list, indicating such of them, if any, as have been honorably discharged from the military or naval service of the United States in the late war. If the appointing officer shall signify that attainment in one or more of the optional subjects is essential, the secretary shall return the names of the three persons whose standings on the denoted optional subjects are the highest (not being below the minimum of seventy). The examining board

Each of the undersigned respectfully represents to the commissioners of,
, city of New York, that he can and does hereby testify that he knows the above applicant personally, and that he is a man of good moral character, of sober and industrious habits, that he has never known him to be guilty or convicted of any criminal act or disorderly conduct, and each of the undersigned further says that he consents that this certificate may be made public, and is willing to furnish any other information respecting the applicant which he may possess.

Name.

Residence.

The second, which must be filled out and signed in the presence of an officer of the department from which the appointment is sought, who shall also sign as witness, shall be as follows :

(N. B.—This statement of applicant must be filled out and signed in the presence of an officer of the department, who shall also sign as witness.)

City of, 188 .

Statement of

Where were you born ?

In what year ? month ? day ?

Where do you live ? (street and number)

How long have you lived in New York city ?

If not born in the United States, have you been naturalized ? when ?
 where ?

Are you married or single or widower ?

What family have you ?

Have you been complained of, indicted for or convicted of any criminal offense ?

. and if so, when and where ?

What is your regular occupation ?

What was your last occupation ?

Have you ever been a policeman (or fireman, as the case may be) ?

If so, where ? and when ?

Have you paid, or promised to pay, or given any money or other consideration, to any person, directly or indirectly, for any aid or influence toward procuring your appointment ?

(a) Have you been in the army or navy of the United States ?

If so, when ? in what capacity ?

Witness Signature of applicant

. Department of the city of New York, ss.:

. being duly sworn, doth depose and say: I signed the above statement, and the same is true to the best of my knowledge and belief.

Sworn to before me this day }
 of 18 . } *Signature of applicant

.

*Signature of officer administering oath.

(a) If the applicant has been in the military or naval service of the United States, he should furnish the name and address of one or more of his surviving officers if practicable. In any case he shall give satisfactory evidence of honorable discharge.

Regulation 19.

The general character of the applicant, including habits and reputation, is to be ascertained in such manner as the examining board may determine ; but in all cases the captain of the precinct in which the applicant resides, if he be an applicant for a position as a policeman in the police department, or in the department of parks, or the chief of battalion most convenient to his residence if he be an applicant for a position in the fire department, shall make diligent in-

quiry concerning him and especially make direct and explicit inquiry of the signers of the applicant's testimonials, and shall report the result of such inquiries to the examining board.

Regulation 20.

In reference to his physical qualifications, every applicant for position in Schedule C shall present to the examining board a statement in which he shall answer in writing the following questions:

Applicant's Statement.

Name
Date of birth.....
Occupation.....
Have you any disease now?.....
What diseases have you had during the last seven years?.....
.....
Do you know of any hereditary disease in your family?.....
If your parents, brothers, or sisters, or any of them, are dead, of what disease did they die?.....
Have you ever had fits?.....
Have you ever had any fracture or dislocation?.....
Have you ever received any injury to the head or spine?.....
Are you subject to piles?.....
Have you been vaccinated?.....
Have you ever had rheumatism?.....

Applicant.

The board shall transmit such statement to the examining surgeon in the appropriate department, who shall be designated by it for that purpose, and he shall examine the applicant in reference to the matters designated in the following schedule, fill up the same in accordance with the result of such examination, and return the application and schedule to the examining board.

Name.....Age.....Residence.....

HAS THE APPLICANT ever been examined by the Medical Officer of the Department, and if so, state the result?

STATE THE EXACT Weight, A; Height, B; Circumference of Chest, C.

WEIGHT.		HEIGHT.		C.
A.	B.	Feet	Inches	
				At forced Expiration... inches
				On full Inspiration... inches

A. IS THE RESPIRING MURMUR clear and distinct over both lungs?
 B. Is the character of the Respiration Full, Easy, and Regular?
 C. Are there any indications of Disease of the Organs of Respiration or their Appendages?

A. IS THE CHARACTER of the Heart's action Uniform, Free and Steady?
 B. Are its Sounds and Rhythm Regular and Normal?
 C. Are there any indications of Disease of this Organ or of the Blood Vessels?

A. IS THE SIGHT GOOD?
 B. Is the hearing good?

IS THE APPLICANT SUBJECT TO COUGH, Expectoration, Difficulty of Breathing, or Palpitation?

A. ARE THE FUNCTIONS of the Brain and Nervous System in a Healthy State?
 B. Has the Brain or Spinal Cord ever been diseased?

IF 'has had any serious illness or injury, state expressly if, is perceptible in the heart, lungs, kidneys or other, or the skin, eyes, ears, limbs, etc.

HAS THE APPLICANT any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula, rheumatism?

DOES THE APPLICANT display any evidence of having or having had any illness?

IF A HED FOR

REMARKS

I.....being duly sworn, depose and say. that I have returned true answers to the inquiries of
.....touching my personal and family health, history, habits, and antecedents; and that I am the person described
in the above record of examination.

Sworn to and subscribed before me, this.....day }
of188.....Notary Public.

I HEREBY CERTIFY that...have this day carefully and thoroughly examined, in accordance with the above instructions,and find that he is.....sound in limb and body, is.....able bodied..... of a robust constitution, has....good eyesight and....good hearing, and in....opinion is.....physically qualified to sustain the labors and exposures, and perform the duties of a.and that the above is a truthful record of the examination.

New York,.....188....

(a) In examining the sense of sight, not only shall the general condition of the organs be ascertained, but weight shall be given to quickness and accuracy in discriminating colors and distances. The hearing shall be tested also as to keenness and correctness in distinguishing degrees and kinds of sounds and the direction from which they come.

STATURE AND WEIGHT.—The stature shall not be below 5 ft. 7 in., nor the weight below that marked as its minimum accompaniment in the subjoined table.**	
Height. Feet. Inches.	Min. Weight. Pounds.
5 7	140
5 8	145
5 9	150
5 10	155
5 11	160
6 —	165
6 1	170
6 2	175
6 3	180
6 4	185

† Minimum circumference of the Chest tolerable in applicants.	
Height. Feet. Inches.	Circumference of Chest. Inches.
5 7	33
5 8	34
5 9	34½
5 10	35
5 11	35½
6 —	36
6 1	36½
6 2	37
6 3	37½
6 4	38

* The Examiners are called upon to pay especial attention to the annexed schedule in determining the fitness of the applicant.

† There should be a difference, at least, of two inches at forced expiration and on full inspiration.

‡ Syphilitic taint in the applicant must always be regarded as good cause of rejection.

** Obesity must be regarded as a good cause for rejection.

Affidavit to be signed and sworn to by applicant.

City and County of New York, ss:

I.....being duly sworn, depose and say, that I have returned true answers to the inquiries of.....touching my personal and family health, history, habits, and antecedents; and that I am the person described in the above record of examination.

Sworn to and subscribed before me, this {
.....day of.....188.. }

Notary Public (or Commissioner of Deeds).

Certificate of Examining Surgeon.

I hereby certify that I have this day carefully and thoroughly examined, in accordance with the above instructions,.....and find that he issound in limb and body, is.....able bodied.....of a robust constitution, has.....good eyesight and.....good hearing, and in my opinion is...physically qualified to sustain the labors and exposures, and perform the duties of a.....and that the above is a truthful record of the examination.

Signed.....

New York,.....188..

Regulation 21.

The examining board shall designate some suitable person who shall also test the strength, activity and physical capacity of the applicant by suitable examination into the strength of his lungs, and the strength of his back, chest, legs and arms. These tests shall be submitted to and approved by the supervisory board, and shall include the applicant's swiftness and endurance in running. In case of applicants for positions on the uniformed force, either of the police department or department of public parks, his skill in the use of the club, and in firing at a mark shall also be tested. Such examiner shall report in writing to the board of examiners the result of such examination.

Regulation 22.

No applicant shall be admitted to examination who is not physically sound.

Regulation 23.

Applicants for positions shall then be submitted for further examination as to general qualifications.

General Qualifications.

1. General character: To include habits and reputation, and to be ascertained in such manner as the examining board may determine with the aid directed by Regulation 18.

2. Experience: Obtained either in actual service as a police officer (or fireman, as the case may be), or in other occupation tending to qualify for such service.

3. Obligatory subjects:

- a. Reading from print and manuscript.
- b. Handwriting, as shown by copying from manuscript.
- c. Writing down from memory the substance of matter orally communicated.
- d. Arithmetic: addition, subtraction, multiplication and division, applied to whole numbers.
- e. Rules and regulations relating to the duties of the position applied for.
- f. In the case of applicants for positions as policemen, questions relating to city government, location of streets, public buildings, railroad depots and other subjects respecting which strangers in the city naturally inquire. In the case of applicants for positions as firemen, these ques-

tions should be directed to the location of streets, and the location and construction of buildings, with especial reference to precautions against fire.

The relative weight given to the several obligatory subjects in making up the average standings, will be as follows:

a. Reading.....	2
b. Handwriting.....	2
c. Writing from memory.....	1
d. Arithmetic.....	1
e. Rules and regulations relating to duties of position.....	3
f. City information (or knowledge of buildings).....	1
Total of weights.....	<u>10</u>

Regulation 24.

In making up the general average of the standing of applicants for positions in Schedule C, the relative value of each qualification and subject shall be as follows:

Physical qualifications.....	4
General character.....	2
Experience.....	1
Obligatory subjects.....	3
Total of values.....	<u>10</u>

The general average shall be ascertained by multiplying the ascertained average standing of the applicant in each qualification by the value attached thereto, and dividing the united products by the sum of the values, by 10.

No person whose standing on any of the qualifications or obligatory subjects enumerated above, except experience, is less than 60, or whose ascertained average on all is below 70, shall be entered on the eligible list.

Regulation 25.

Under the head of "Rules and Regulations," the examiners shall endeavor to test the natural or acquired fitness of the applicants for their work. They shall be given, a reasonable time before the examination, a copy of selected rules and regulations covering the more important branches of their future duty. Cases shall be described to them — preferably actual cases taken from correct reports — and they shall be required to state their view of what the rules would require of them in such cases. This inquiry shall include a report, such as a policeman or fireman would be obliged to make of such an occurrence.

Regulation 26.

Promotions to all positions included in Schedule C shall be made from the next lower grade by competitive examination. The subject of such examination shall be as follows:

	MARKS.
1. Writing from dictation.....
2. Handwriting.....
3. Knowledge of the "Rules and Regulations".....
4. Fines and penalties last three years.....
5. Arrests for last twelve months.....
6. Veracity.....
7. Habits as to use of liquor.....
8. Ability and energy.....
9. Coolness and judgment in emergencies.....
10. Deportment toward citizens.....

	MARKS
11. Character for maintaining discipline among, and getting good work from subordinates
12. Physical condition, including activity and endurance
13. Knowledge of laws and ordinances relating to his duties
14. Memory for persons, places and dates, and general knowledge of localities
15. United States infantry tactics, and manual of the use of the club, as authorized by the department
Average

In examining gate-keepers, roundsmen, and all persons employed in the fire department for promotion, Nos. 5, 10, 14 and 15 shall be omitted, and on examining gate-keepers and patrolmen for promotion No. 11 shall be omitted. The standing of applicants for promotion in reference to subjects 1, 2, 3, 12, 13, 14 and 15 shall be determined by examination. Their standing in reference to subjects 4, 5, 6, 7, 8, 9, 10 and 11 shall be determined by the records of the department, in which each man's conduct and actions shall be entered.

Regulation 27.

During the period of probation provided for by these rules, all persons admitted on such probation to positions in Schedule C shall pass such portion of their time as the department shall require in the School of Instruction, and no person shall receive an appointment to a position in either department unless at the end of the period of probation the Instructor of the School of Instruction shall report to the Commissioners that such applicant is competent to become a member of the force. In the case of persons applying to become members of the Life Saving Corps of the fire department, no person shall receive such appointment unless at the expiration of such period of probation the instructor shall report to the commissioners of the fire department that such applicant is competent to become a member of the Life Saving Corps.

Regulation 28.

The capacity, mental, physical and educational, of every member of the uniformed force of the police and fire departments and the department of public parks shall be inquired into once every three years during his term of service, and his fitness to continue in the service be determined thereby.

Regulation 29.

SCHEDULE D.

The board of examiners shall examine every applicant eligible under these rules for a position in Schedule D, and shall give a certificate of qualification to such person only when satisfied—

FIRST. That he (or she) is within the limits of age prescribed for the situation named.

SECOND. That he (or she) is free from any physical defect or disease likely to interfere with the proper discharge of his (or her) duties.

THIRD. That his (or her) character is such as to qualify him (or her) for such employment; and

FOURTH. That he (or she) possesses the requisite knowledge and ability to enter upon the discharge of the duties of such situation or employment.

The fourth article of the certificate shall be determined by the examining board from the results of the competitive examination of the different persons applying for the position to which the appointment is to be made. This examination shall have reference to the special qualifications, expert or otherwise, required for that particular position and shall be practical in its character.

Regulation 30.

The general examination for admission to the subordinate places in Schedule D (being Part 2 of the classification hereto annexed) shall be in writing, and on the following subjects :

- 1. Handwriting (as shown in examination papers).
- 2. Arithmetic, viz. : addition, subtraction, multiplication, and division.
- 3. Questions relating to the city of New York.
- 4. Questions relating to the technical knowledge required for the position sought by the applicant.
- 5. Experience tending to qualify him for that position.

In addition to this the health and physical vigor of the applicant shall be tested, as hereinafter required.

The relative weight to be given to these several subjects in making up the average standings shall be as follows:

1. Handwriting	1
2. Arithmetic	1
3. New York city information.	1
4. Technical knowledge.....	5
5. Experience	2
<hr/>	
Total of weights.....	10
<hr/>	

No person shall be admitted as a competitor for appointment to any of the superior positions in Schedule D (being part 1 of the classification hereto annexed) who shall not produce to, and leave for a reasonable time with, the examining board, a diploma or certificate from some reputable institution, showing that he has pursued in such institution, with credit, for two years, a course of study adapted to qualify him for the position which he seeks, or for which his appointment is desired.

He may, however, produce in lieu of such diploma or certificate, certificates from one or more professional men in good standing, to the effect that he has pursued with them or under their direction, and with credit to himself, a course of study similar to that before mentioned, for at least three years.

Those admitted to competition for the superior positions in Schedule D shall be examined in writing on the following subjects:

- 1. The technical knowledge required for the position to be filled, and respecting which the examination is held.
- 2. Experience tending to qualify the applicant for that position.

In addition to this, the examining board shall make inquiries in writing of the persons with whom the applicant has studied, or by whom he has been employed, on the following subjects:

- 3. Efficiency and accuracy in his own work.
- 4. Character for maintaining discipline among, and getting good work from, his subordinates.

The relative weight to be given to these several subjects shall be as follows:

1. Technical knowledge	50
2. Experience	20
3. Efficiency and accuracy in work.	15
4. Character for maintaining discipline, etc.....	15
<hr/>	
	100
<hr/>	

Regulation 31.
SCHEDULE E.

The names of applicants for positions as nurses, attendants and orderlies for the city hospitals and asylums, heads of training-schools, matrons and helpers, shall be registered, and when a sufficient number have applied they shall be

summoned for examination. The examiners shall make inquiry regarding the age, condition of health, moral character, sobriety, personal habits, temper and temperament of each applicant. The educational test shall be the ability to read, write legibly and work simple problems in addition and subtraction.

The board shall place upon a register the names of the applicants passed by them as eligible, such names being placed in the order of excellence of the applicants — there being distinct registers for each class of position.

Whenever there are vacancies in the positions mentioned in this regulation that cannot be filled by promotion, the appointing officer shall notify the secretary of the examining board, giving the names and number of the positions to be filled, and the institution or institutions in which the vacancies exist. The secretary shall then summon the five applicants whose names stand highest on the proper register to appear at such place, day and hour as the Commissioners may have directed. The head of the institution in which the vacancy exists shall then and there select from the applicants so summoned and present a person for employment for the vacant position. If there be more than one vacancy in any class, there shall be summoned by the secretary, in addition to the five as above, one person for every such additional vacancy, and the selections shall be made in the order of time in which the vacancies occurred.

Whenever the secretary sends out such notices to appear, he shall send a check list of the same to the Commissioners, giving names of applicants summoned, their grading upon their examination, and class of position for which eligible. The name of an applicant summoned five times and not selected, shall be dropped from the register. The name of an applicant peremptorily rejected by the appointing officer shall be dropped forthwith.

Regulation 32.

It shall be in the power of the supervisory board, to institute non-competitive examinations for the following positions: Physician, surgeon, chief of staff of hospital, medical officer, medical superintendent, stewards of hospitals, asylums and almshouses, assistant medical superintendent in the asylum for the insane, principal matrons, heads of training schools, morgue superintendent.

Regulation 33.

In any case where vacancies shall occur in the Department of Charities and Correction, and there shall not be a sufficient number of applicants for the positions so becoming vacant to enable the examining board to hold a competitive examination, a non-competitive examination may be had of such applicants as may present themselves; but no appointment to fill such vacancies shall be made of any person not certified by the examining board to be, in their judgment, competent to fill the same.

Regulation 34.

Prison Guards.

Applicants for the position of guards, watchmen or keepers in prisons and workhouses shall not receive an appointment until they have successfully passed a physical examination by a prison physician.

The physician making such examination shall answer the following inquiries:

1. Is the candidate of sound physical condition?
2. Is his respiration full and free?
3. Is his voice clear and distinct?
4. Is his sight good?
5. Is his hearing sharp and quick?
6. Is the action of his heart natural?
7. Is he free from nervous complaints?
8. Is he free from headaches and fits?
9. Is he free from rupture?

10. Is he free from varicose veins ?
11. Is he free from all internal complaints ?
12. Are there any circumstances connected with health or strength that can in your opinion tend to render the applicant unfit for prison service, as a guard or keeper ? If so, please state them.

Certificate.

The following certificate must be given in such cases by the examining physician to all applicants approved by him:

I.....do hereby certify that I have examined
.....the above applicant, and having in view
all and several the answers to the above questions, I do further certify that I
find him physically fit for the prison service of the State of New York.

(Signature).

Dated at this.....day of }
.....188.. }

Regulation 35.

Probation.

All employment in positions under any of the schedules, except Schedule G, shall be provisional, and such provisional service shall continue six months, except in Schedule C, when it shall be for one month, during which period the person so employed may at any time be peremptorily discharged from service. If during that period (subject as to policemen and firemen to regulation 27) the conduct and character of the appointee are found satisfactory to the appointing officer, he shall, at the close thereof, receive an appointment, but otherwise his employment shall cease. Any one failing to receive appointment at the end of six months, shall be ineligible for one year for appointment in the municipal service in any department.

Regulation 36.

Every officer under whom any person shall serve during any part of the probation provided for by these regulations, shall carefully observe the quality and value of the service rendered by such person, and shall report to the proper appointing officer, in writing, the facts observed by him, showing the character and qualifications of such person, and of the service performed by him, and such reports shall be preserved on file.

Regulation 37.

Whenever the special qualifications required for a position are such that, in the opinion of the examining board, advice and assistance from experts are required, the supervisory board may designate, from among the persons in the employ of the department to which the applicant seeks admission, some suitable person to aid the examining board in determining such qualifications.

Regulation 38.

Every false statement knowingly made by any person in his application for examination, and every connivance by him at any false statement made in any certificate which may accompany his application, shall be regarded as good cause for the removal or discharge of such person.

Regulation 39.

No one dismissed from the service for misconduct shall be eligible to appointment in any capacity in any department of the municipal service within three years.

Regulation 40.

All appointments made under these regulations, except under Schedule G, shall be published in the CITY RECORD within five days, giving in each instance the names of the citizens who have certified the character of the person appointed.

Regulation 41.

No person in the public service is under any obligation to contribute to any political fund, or to render any political service, and no person shall be removed or otherwise prejudiced for refusing to do so.

Regulation 42.

No person in said service shall use his official authority or influence to coerce the political action of any person or body.

Regulation 43.

Notice shall be given in writing by the appointing power to the secretary of the person selected for employment or appointment from among those who have been examined, of the place of residence of such persons, of the rejection of any such persons after probation, of transfers, resignations, and removals, and of the date thereof, and a record of the same shall be kept by said secretary.

Regulation 44.

No temporary appointment shall be made of any one not on the eligible list for permanent appointment, except as follows: In the prisons, reformatories and asylums temporary substitutes may be appointed, without examination, for not exceeding thirty days, but such temporary appointment can be made only once. In the office of the receiver of taxes temporary appointments may be made without examination, as they have been heretofore commonly made during the busy season for the collection of taxes. Every temporary appointment under this regulation must be reported to the secretary within five days, with the reason for the same.

Regulation 45.

No person on the eligible list shall be certified more than five times to the same appointing officer, except at his request, nor shall the name of any person remain on the eligible list more than two years from the date of examination. No person while remaining eligible on any list shall be admitted to a new examination for a position in the same schedule.

Regulation 46.

All officials connected with any office in, or for which any examination shall take place, shall give the supervisory board and the boards of examiners such information as may be reasonably required to enable them to select competent and trustworthy examiners; and the examination by such examiners, and the work incident thereto, shall be regarded as a part of the public business to be performed at such office.

Regulation 47.

Persons who have been honorably discharged from service in the army or navy of the United States, in the late war, shall be preferred for appointment to positions in the civil service over other persons of equal standing as ascertained under these regulations, and the person thus preferred shall not be disqualified from holding any position in the civil service on account of his age, or by reason of any physical disqualification, provided such disability does not render him incompetent to perform the duties of the position applied for.

Regulation 48.

No question in any examination, or proceeding by, or under these regulations, shall call for the expression or disclosure of any political or religious opinion or affiliation, and if such opinion or affiliation be known, no discrimination shall be made by reason thereof by the examiners or the appointing power. The examiners shall discountenance all disclosure of such opinion by or concerning any applicant for examination, or by or concerning any one whose name is on any eligible list awaiting appointment.

Regulation 49.

The examining board or the secretary may give a certificate to any person examined, except under schedule G, stating the grade which such person attained and the proficiency in the several subjects, shown by the markings.

Regulation 50.

Defective applications shall be suspended and applicants notified to amend the same, but no such notice shall be given, or opportunity granted, a second time. Whenever the application shows that the applicant is not within the prescribed limits of age, or otherwise not qualified under the regulations, or is manifestly unfit for the service, the application shall be rejected.

Regulation 51.**PROMOTION.**

Promotions from the lower grades to the higher shall be on the basis of merit and competition.

Regulation 52.

Except as herein otherwise provided the positions in the various schedules shall be filled, when vacant, by the promotion of those in the service in similar or lower grades in the department, office or institution in which the vacancy or vacancies may occur. Promotions shall be made, subject to the provisions of these regulations, by the officer or officers having the power of appointment. If, in the judgment of such officer or officers, there be none found in the similar or lower grades fit to perform the duties in such vacant positions, in that case, and in no other, the positions may be filled in the same manner as is prescribed by these regulations for filling the positions in the lowest grade of the same subdivision and class.

Regulation 53.

Promotion shall, in all cases, be based upon the positive merit of the person promoted, and upon his superior qualifications as shown by his previous service.

No person in the service who has not passed an examination under these regulations or those heretofore prescribed shall be promoted or transferred to any position for which examination is required without passing an examination under the regulations, of the same character as would an applicant for appointment to that position in the service.

Fitness for promotion shall be determined by the actual work of the persons named therefor, by the certificate of their immediate official superiors that their efficiency and conduct during their past service have been, in all respects, satisfactory, and entitle them to favorable consideration, and by examination.

Regulation 54.

No recommendation of any person for promotion shall be entertained unless made in the regular course of duty by his immediate official superiors, and the presentation of any recommendation other than that of such superiors will be considered an unwarrantable interference with the public service, and the person so recommended may be required to show, before being certified for promotion, that such recommendation was not made by his request or with his connivance.

Regulation 55.

Examiners of persons named for promotion shall personally question them concerning their office-work and its purposes, in order to ascertain if they have a general and intelligent knowledge of the business in the department in which they are employed, and may require the persons examined to give a written description of the work done by them, and its relation to the duties of others.

Regulation 56.

Subject only to the qualifications required to be ascertained in accordance with these regulations, the power of appointment, and the responsibility

of selection are in all cases in the appointing officer. The power of any officer to remove is not impaired by any thing contained in these regulations.

Regulation 57.

Complaints of injustice or unfairness on the part of any examiner or examining board, or of any one acting under the supervisory board, shall be considered by such board, which reserves the right to revise the marking and grading on the papers, or order a new examination, or otherwise act as substantial justice in the premises may require.

Regulation 58.

CONDUCT OF EXAMINATIONS.

Applicants shall be admitted to examination upon the production of the official notification to appear for that purpose. Each applicant shall receive a number, which shall be indorsed upon his notification when produced, and the notifications so indorsed shall be sealed in an envelope. Each applicant shall sign his examination papers with his number, omitting his name, and the envelope shall not be opened until all the examination papers have been received and the markings and gradings made.

Regulation 59.

All examinations shall be in writing, except such as refer to physical qualities or expertness, and except as herein otherwise provided.

Regulation 60.

The sheets of questions shall be numbered and shall be given out in the order of their numbers, each, after the first, being given only when the competitor has returned to the examiners the last sheet given to him. In general, no examination shall extend beyond five hours without intermission; and no questions given out at any session, to any candidate, shall be allowed to be answered at another session. Each applicant must complete his examination on the obligatory subjects before taking up any of the optional subjects.

Regulation 61.

Each examiner shall exercise all due diligence to secure fairness and prevent all collusion and fraud in the examinations.

Regulation 62.

The time allowed for completing the examination shall be announced before the first paper is given out. For the obligatory subjects the examination shall be confined to a single day.

Regulation 63.

MARKING.

The examination papers shall be reviewed by each examiner separately, except where otherwise directed by the supervisory board, and, in any case of disagreement, the average of the markings made on any question or paper by all shall be the final marking on such question or paper subject to the regulation as to revision.

Regulation 64.

Handwriting shall be judged by its legibility, uniform and correct formation of letters and ease of execution. Upon a comparison of the handwriting of all the competitors the best and worst shall be first agreed upon, and the two extremes of the scale thus fixed; the others shall be marked relatively to such extremes. In writing from dictation or copying from manuscript, the omission, repetition or substitution of words, the erasures, blots and other evidences of carelessness shall, proportionately to their numbers, reduce the marking below 100. Spelling shall be marked with reference to the ratio the misspelled words bear to the whole number of words dictated. Making abstracts or summaries of documents, and letter-writing shall be marked as in handwriting, by agreeing upon the best and worst examples and having marked them, then proportionately marking the others.

Regulation 65.

Every paper in any examination not formally certified by the examiners shall be signed with his initials in ink by each examiner who has reviewed and marked it.

Regulation 66.

The regulations for admission to the civil service of the city of New York, and to any branch thereof heretofore prescribed or established, and the appointment of examiners thereunder made, are hereby annulled and withdrawn, provided, however, that the examiners heretofore appointed shall continue in office until their successors are appointed, and that nothing herein contained shall affect any examination heretofore held, or any grading had thereunder, or any eligible list heretofore formed, or any appointment heretofore duly made in pursuance of such regulations hereby annulled; and every eligible list duly formed under such regulations shall in all respects be deemed to be formed under the foregoing regulations and to be an eligible list for the class specified in the classification hereto annexed most nearly resembling the same.

NEW YORK CIVIL SERVICE COMMISSION, }
August 23, 1884. }

The foregoing regulations are approved by the New York Civil Service Commission.

JOHN JAY,
President of the New York Civil Service Commission.

APPENDIX A.

Schedule A shall comprise Subdivision II of Class 1 of each Department in the appended classification, Chaplains, Subdivision I of Class 2 of the Law Department, Assistant Attorneys in the Fire Department, and Private Secretary of the Commissioner in the Department of Street Cleaning, and Subdivision I of Class 2 of the Department of Charities and Correction.

The election officers now in office, and the Inspectors of Election and Poll Clerks, are exempt from examination as required by chapter 357 of the Laws of 1884. Special Patrolmen, appointed pursuant to section 269 of the New York City Consolidated Act, are also exempt from examination.

Schedule B shall comprise Subdivision I of Class 1 of each Department in the appended classification.

Schedule C shall comprise Class 3 of the Police Department, the Fire Department and the Department of Public Parks, in the appended application.

Schedule D, Part I, shall comprise:

In Department of Taxes and Assessments (Class 2) Subdivision II, except first and second grades.

In Department of Public Works (Class 2) Subdivision II, fifth, sixth and seventh grades.

In Department of Docks (Class 2) Subdivision II, fourth and fifth grades.

In Health Department (Class 2) Subdivisions I and II, and persons in Subdivision III who do not come within Schedule E, but must yet hold diplomas as Physicians.

In Department of Public Parks (Class 2) Subdivisions I, except first and second grades, and III.

In the Aqueduct Commission (Class 2) Subdivision I, except first, second and third grades.

Schedule D, Part II, shall comprise:

In Finance Department (Class 2) Subdivision II.

In Department of Public Works (Class 2) first four grades of Subdivision II, Subdivisions III, IV and VI.

In Department of Docks (Class 2) Subdivision II, grades one to four, inclusive, Subdivisions III and VIII, and Inspectors in Subdivision VI.

In Department of Charities and Correction (Class 2) Subdivision XI, and the Photographer of the Unknown Dead.

In Department of Street Cleaning (Class 2) Subdivisions II, III and VII.

In the Health Department (Class 2) Subdivision VI, and persons in Subdivision III who do not come in Schedule E or Part I of this Schedule.

In Fire Department (Class 2) Subdivisions II, III and V.

In Police Department (Class 2) Subdivisions I and III.

In Department of Public Parks (Class 2) first and second grades of Subdivision I, Subdivisions II and V.

In Aqueduct Commission (Class 2) first, second and third grades of Subdivision I, Subdivisions II and IV.

Schedule E shall include:

In the Department of Charities and Correction (Class 2) Subdivision III, except Chaplains; Subdivision IV and Assistant Matrons, Apothecaries and Druggists.

In Health Department (Class 2) Subdivision IV and Physicians, Chemists and Analyzers, Surgeons in the Police and Park Departments, and Medical Officers in the Fire Department.

Schedule F shall comprise:

In the Mayor's Office (Class 2) Subdivisions I, II and III.

In Finance Department (Class 2) Subdivisions I and III.

In Department of Taxes and Assessments (Class 2) Subdivisions I, III, IV, and V.

In Law Department (Class 2) Subdivisions II and III.

In Department of Public Works (Class 2) Subdivisions I, V and VII.

In Department of Docks (Class 2) Subdivisions I, IV, V, VI, VII (except Inspectors) and IX.

In the Department of Charities and Correction (Class 2) Subdivisions II, V, VI, VIII, X and XII and teachers.

In Department of Street Cleaning (Class 2) Subdivisions I, V, VI and VIII.

In Health Department (Class 2) Subdivisions V and VII.

In Fire Department (Class 2) Subdivisions IV and VI.

In Police Department (Class 2) Subdivisions II and IV.

In Department of Public Parks (Class 2) Subdivisions IV and VI.

In the office of the Supervisor of the City Record (Class 2) Subdivisions I and II.

In the office of the Commissioners of Accounts (Class 2) Subdivisions I and II.

In the Aqueduct Commission (Class 2) Subdivisions III and V.

Schedule G shall comprise that Subdivision of Class 2 of each Department in the appended classification containing laborers.

CLASSIFICATION OF THE CIVIL SERVICE OF THE CITY OF NEW YORK.

MAYOR'S OFFICE.

CLASS 1.

Subdivision I.

Clerks, as in finance department.

Subdivision II.

Secretary ; chief clerk ; marshal ; registrar.

CLASS 2.

Subdivision I.

Messengers and persons of like employment.

Subdivision II.

Keeper in dog pound ; assistant keeper in dog pound.

Subdivision III.

All persons in this department not classified elsewhere.

Subdivision IV.

Laborers.

FINANCE DEPARTMENT.

CLASS 1.

Subdivision I.

First Grade — Clerks, and like employes, receiving an annual compensation of less than \$1,000.

Second Grade — Clerks, and like employes, receiving an annual compensation of \$1,000 or more, but less than \$1,200.

Third Grade — Clerks, and like employes, receiving an annual compensation of \$1,200 or more, but less than \$1,500.

Fourth Grade — Clerks, and like employes, receiving an annual compensation of \$1,500 or more, but less than \$1,800.

Fifth Grade — Clerks, and like employes, receiving an annual compensation of \$1,800 or more, but less than \$2,000.

Sixth Grade — Clerks, and like employes, receiving an annual compensation of \$2,000 or more, but less than \$2,500.

Seventh Grade — Clerks, and like employes, receiving an annual compensation of \$2,500 or more.

Subdivision II.

Deputy comptroller and assistant ; heads of bureaus ; general bookkeeper ; city paymaster.

CLASS 2.**Subdivision I.**

Messengers ; doorkeepers , watchmen.

Subdivision II.

Skilled mechanics and tradesmen.

Subdivision III.

All persons in this department not classified elsewhere.

Subdivision IV.

Laborers.

DEPARTMENT OF TAXES AND ASSESSMENTS.**CLASS 1.****Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Secretary ; deputy commissioners, receiving an annual compensation of \$3,000 or more.

CLASS 2.**Subdivision I.**

Deputy commissioners, receiving an annual compensation of less than \$3,000.

Subdivision II.

Surveyors.

First Grade — Deputy surveyor.

Second Grade — Surveyor.

Subdivision III.

Assessors.

Subdivision IV.

Messengers and persons of like employment.

Subdivision V.

All persons in this department not classified elsewhere.

Subdivision VI.

Laborers.

LAW DEPARTMENT.**CLASS 1.****Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Assistants receiving an annual compensation of \$4,000 or more ; chief clerk ; public administrator ; corporation attorney.

CLASS 2.**Subdivision I.**

Assistants receiving an annual compensation of less than \$4,000.

Subdivision II.

Messengers and persons of like employment.

Subdivision III.

All persons in this department not classified elsewhere.

Subdivision IV.

Laborers.

DEPARTMENT OF PUBLIC WORKS.

CLASS 1.

Subdivision I.

Clerks, as in finance department.

Subdivision II.

Deputy Commissioner ; chief clerk ; chief engineer ; consulting engineer ; water register ; water purveyor ; engineer in charge of sewers ; superintendent of street improvement ; superintendent of streets ; superintendent of lamps and gas ; superintendent of repairs and supplies ; superintendent of incumbrances.

CLASS 2.

Subdivision I.

Superintendent of water supply ; superintendent of pipe yard ; superintendent of baths ; assistant superintendent of baths.

Subdivision II.

First Grade — Chainmen and flagmen.

Second Grade — Rodmen.

Third Grade — Levelers.

Fourth Grade — Transitmen.

Fifth Grade — Assistant engineers.

Sixth Grade — First assistant engineer.

Seventh Grade — Resident engineer ; topographical engineer.

Subdivision III.

Draughtsmen.

Subdivision IV.

Inspectors.

First Grade — Inspectors of meters ; inspectors of waste of water ; inspectors of regulating and grading ; inspectors of paving ; inspectors of sewers.

Second Grade — Assistant general inspectors.

Third Grade — General inspectors.

Subdivision V.

Messengers ; keepers ; watchmen ; janitors ; elevator attendants ; keepers and attendants on public baths.

Subdivision VI.

Engineers and skilled mechanics and tradesmen.

Subdivision VII.

All persons in this department not classified elsewhere.

Subdivision VIII.

Laborers.

DEPARTMENT OF DOCKS.

CLASS 1.

Subdivision I.

Clerks, as in finance department.

Subdivision II.

Secretary ; engineer in chief.

CLASS 2.**Subdivision I.**

Superintendent of section ; superintendent of machinery ; master mason ; master dock builder ; foreman of piling and wood work.

Subdivision II.

First Grade — Chainmen.

Second Grade — Rodmen ; sounders.

Third Grade — Levelers ; hydrographers.

Fourth Grade — Assistant to engineer in chief ; surveyor ; assistant surveyor.

Fifth Grade — First assistant engineer.

Subdivision III.

Draughtsmen.

Subdivision IV.

Dock masters.

Subdivision V.

Captains of floating property.

Subdivision VI.

Foremen ; inspectors ; roundsmen ; time keepers.

Subdivision VII.

Messengers ; doormen ; watchmen ; office keeper.

Subdivision VIII.

Mechanical engineers and skilled mechanics and tradesmen.

Subdivision IX.

All persons in this department not classified elsewhere.

Subdivision X.

Laborers.

DEPARTMENT OF PUBLIC CHARITIES AND CORRECTIONS.

CLASS 1.**Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Secretary ; general bookkeeper and auditor ; purchasing agent ; general store-keeper.

CLASS 2.**Subdivision I.**

Wardens of prisons, asylums, almshouses and workhouses, medical superintendents of asylums and hospitals ; chiefs of staff of hospitals ; superintendents of workhouses ; and superintendent of out-door poor department.

Subdivision II.

Deputy wardens of prisons ; stewards of hospitals, asylums and almshouses ; assistant medical superintendent of asylum for the insane.

Subdivision III.

Physicians; assistant physicians; chaplains; principal matrons; heads of training schools.

Subdivision IV.

Nurses, orderlies and attendants in hospital and asylums.

First Grade — Such persons receiving an annual compensation of less than \$200.

Second Grade — Such persons receiving an annual compensation of \$200 or more.

Subdivision V.

First Grade — Guards and watchmen in prisons and workhouses.

Second Grade — Deputy keepers and keepers receiving an annual compensation of \$600 or less.

Third Grade — Keepers in prisons and workhouses receiving an annual compensation of more than \$600.

Subdivision VI.

Watchmen in hospitals, asylums and almshouses.

Subdivision VII.

Teachers and assistant matrons.

Subdivision VIII.

Morgue superintendent; superintendent of drug department; superintendent of stables.

Subdivision IX.

Chemist; photographer of the unknown dead.

Subdivision X.

Messengers and persons of like employment.

Subdivision XI.

Engineers and skilled mechanics and tradesmen.

Subdivision XII.

All persons in this department not classified elsewhere.

Subdivision XIII.

Laborers.

DEPARTMENT OF STREET CLEANING.

CLASS 1.**Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Deputy commissioner; chief clerk; superintendent.

CLASS 2.**Subdivision I.**

Assistant superintendent; district superintendents; superintendent of tugs and scows; superintendent of stables.

Subdivision II.

First Grade — Assistant district inspectors.

Second Grade — District inspectors.

Subdivision III.

Inspectors at dumping places.

Subdivision IV.*First Grade* — Assistant foremen.*Second Grade* — Foremen.**Subdivision V.**

Captains of tugs; pilots.

Subdivision VI.

Messengers and persons of like employment ; time collector.

Subdivision VII.

Engineers and skilled mechanics and tradesmen.

Subdivision VIII.

All persons in this department not classified elsewhere.

Subdivision IX.

Laborers.

HEALTH DEPARTMENT.**CLASS 1.****Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Secretary ; sanitary superintendent ; attorney and counsel ; register of records.

CLASS 2.**Subdivision I.**

Assistant sanitary superintendent ; deputy register of records ; chiefs of division.

Subdivision II.

Sanitary inspectors.

Subdivision III.

Physicians ; chemists and analyzers ; inspectors of milk ; inspectors of meat ; inspector of offensive trades ; inspector of new buildings ; general and special inspectors ; inspectors of vaccination.

Subdivision IV.*First Grade* — Orderlies, waitresses and helpers in hospitals.*Second Grade* — Matrons and nurses.**Subdivision V.**

Messengers and persons of like employment.

Subdivision VI.

Engineers and skilled mechanics and tradesmen.

Subdivision VII.

All persons in this department not classified elsewhere.

Subdivision VIII.

Laborers.

FIRE DEPARTMENT.**CLASS 1.****Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Secretary ; inspector of combustibles ; fire marshal ; inspector of buildings ; attorney ; book-keeper.

CLASS 2.

Subdivision I.

Medical officers ; assistant attorneys.

Subdivision II.

First Grade — Examiners receiving an annual compensation of less than \$1,200.

Second Grade — Examiners receiving an annual compensation of \$1,200 or more.

Subdivision III.

First Grade — Assistant operators.

Second Grade — Operators.

Third Grade — Chief operator.

Fourth Grade — Superintendent of telegraph.

Subdivision IV.

Messengers and persons of like employment.

Subdivision V.

Engineers and skilled mechanics and tradesmen.

Subdivision VI.

All persons in this department not classified elsewhere.

Subdivision VII.

Laborers.

CLASS 3.

Uniformed force.

Subdivision I.

First Grade — Firemen.

Second Grade — Assistant foremen.

Third Grade — Foremen.

Fourth Grade — Chiefs of battalion.

Fifth Grade — Assistant chiefs of department.

Sixth Grade — Chief of department.

Subdivision II.

First Grade — Assistant engineers of steamer.

Second Grade — Engineers of steamer.

POLICE DEPARTMENT.

CLASS 1.

Subdivision I.

Clerks, as in finance department.

Subdivision II.

Chief clerk ; chief of elections.

CLASS 2.

Subdivision I.

First Grade — Operators.

Second Grade — Superintendent of telegraph.

Subdivision II.

Messengers ; janitor.

Subdivision III.

Engineers and skilled mechanics and tradesmen.

Subdivision IV.

All persons in this department not classified elsewhere.

Subdivision V.

Laborers.

CLASS 3.

The police force.

Subdivision 1.

First Grade — Patrolmen.

Second Grade — Sergeants.

Third Grade — Captains.

Fourth Grade — Inspectors.

Fifth Grade — Superintendent.

Subdivision II.

Doormen.

Subdivision III.

Surgeons.

DEPARTMENT OF PUBLIC PARKS.

CLASS 1.**Subdivision I.**

Clerks, as in finance department.

Subdivision II.

Secretary ; superintendent ; engineer of construction ; topographical engineer :
superintendent of twenty-third and twenty-fourth wards.

CLASS 2.**Subdivision I.**

First Grade — Chainmen.

Second Grade — Rodmen.

Third Grade — Assistants.

Fourth Grade — Assistant engineers ; assistant engineer and draughtsman.

Subdivision II.

Draughtsmen ; computers.

Subdivision III.

Meteorologist ; architect.

Subdivision IV.

Messengers and persons of like employment.

Subdivision V.

Skilled mechanics and tradesmen.

Subdivision VI.

All persons in this department not classified elsewhere.

Subdivision VII.

Laborers.

CLASS 3.

Park police.

Subdivision I.

First Grade — Gatekeepers.

Second Grade — Patrolmen.

Third Grade — Roundsmen.

Fourth Grade — Sergeants.

Fifth Grade — Captain.

Subdivision II.

Surgeon.

SUPERVISOR OF THE CITY RECORD.

CLASS 1.

Subdivision I.

Clerks, as in finance department.

Subdivision II.

Supervisor of the City Record.

CLASS 2.

Subdivision I.

Messengers and persons of like employment.

Subdivision II.

All persons in this department not classified elsewhere

Subdivision III.

Laborers.

COMMISSIONERS OF ACCOUNTS.

CLASS 1.

Clerks, as in finance department.

CLASS 2.

Subdivision I.

Messengers, and persons of like employment.

Subdivision II.

All persons in this department not classified elsewhere.

Subdivision III.

Laborers.

AQUEDUCT COMMISSION.

CLASS 1.

Subdivision I.

Clerks, as in finance department.

Subdivision II.

Secretary ; chief engineer ; consulting engineer ; executive engineer.

CLASS 2.

Subdivision I.

First Grade — Chainmen and rodmen.

Second Grade — Levelers.

Third Grade — Transltsmen.

Fourth Grade — Assistant engineers.

Fifth Grade — Resident engineers.

Sixth Grade — Division engineers.

Seventh Grade — Engineer in charge of construction ; engineer in charge of surveying.

Subdivision II

Draughtsmen.

Subdivision III.

Messengers, and persons of like employment.

Subdivision IV.

Mechanical engineers and skilled laborers.

Subdivision V.

All persons in this department not classified elsewhere.

Subdivision VI

Laborers.

MUNICIPAL SERVICE EXAMINING BOARD.

CLASS 1.

Subdivision II.

Examiners and secretary.

[In the foregoing classification each department is classified by itself. Class I in each department includes assistants and deputies of executive and administrative officers and all clerks and other persons, of whatever designation, rendering services similar to those of clerks. The remaining persons in each department are embraced in class II. In the departments having a uniformed force, however the police department, the fire department, and the department of public parks class III is added to comprise this body.]

APPENDIX F.

CIVIL SERVICE REGULATIONS OF THE CITY OF BROOKLYN.

[Prescribed by Hon. Seth Low, Mayor, 15th August, 1884. Approved by the Civil Service Commission of the State of New York, 26th August, 1884. Date upon which the regulations take effect, 12th September, 1884.]

MAYOR'S OFFICE, CITY HALL,
BROOKLYN, *August 15, 1884.* }

In pursuance of the eighth section of chapter 354 of the Laws of 1883, as amended by chapters 357 and 410 of the Laws of 1884, I, Seth Low, Mayor of the city of Brooklyn, hereby prescribe the following regulations for the admission of persons into the Civil Service of the city of Brooklyn; and do establish the following regulations for the conduct of persons who may receive appointments in the said service. The regulations following shall take effect, after receiving the approval of the Civil Service Commission of the State of New York, fifteen days after the regulations with such approval are filed in the office of the city clerk.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Brooklyn, with the following exceptions, specified in the above-named Act, viz.:

"Officers elected by the people and the subordinates of any such officer for whose errors or violation of duty said officer is financially responsible, and the head or heads of any department of the city government and persons employed in or who seek to enter the public service under the educational department of any city, and any subordinate officer who by virtue of his office has personal custody of public moneys or public securities, for the safe keeping of which the head of an office is under official bonds."

Appendix A, entitled "Excepted Positions," specifies the officers so excepted.

Regulation 2.

The several clerks and persons employed, or being in the public service of Brooklyn, are hereby, pursuant to the provisions of the said Act, first classified as follows (the excepted class being heretofore stated in Regulation 1):

Schedule A shall include all persons who are not employed as laborers or day workmen, and who are not to be appointed upon competitive examination. The positions in Schedule A are specified in Appendix B, which is to be deemed part of these regulations, entitled "Positions in Schedule A."

There shall also be included in Schedule A, in the event of an epidemic or other similar emergency in which the public health is seriously endangered, such experts and special inspectors as the commissioner of health may, with the written approval of the Mayor, appoint. Such appointment shall, however, continue only during the existence of such epidemic or similar emergency.

Schedule B shall include all persons who are to be appointed upon competitive examination. The positions in Schedule B are specified in Appendix C, which is to be deemed part of these regulations, entitled "Positions in Schedule B."

Schedule D shall include all persons employed as laborers or day workmen. The positions in Schedule D are specified in Appendix D, which is to be deemed part of these regulations, entitled "Positions in Schedule D."

Any new position in any of the departments or any position omitted from these schedules and the said appendices (and not within the excepted class), is also to be deemed included in these regulations; and, if occasion should arise, such position will be assigned by the mayor to its proper schedule, under the provisions of regulation 26. Until so assigned, any such position shall be deemed to be in Schedule B, and in the class and grade therein containing positions most nearly like such new or omitted position.

Regulation 3.

The several clerks and persons employed or being in the public service of Brooklyn, and included in Schedule B, are hereby, pursuant to the provisions of the said act, further arranged in classes as shown in the Appendix E, which is to be deemed part of these regulations, entitled "Classification of the positions in Schedule B, for the purposes of examination."

Regulation 4.

For the purpose of conducting the inquiries and making the examinations mentioned in section 8 of the said law as amended, the mayor shall employ eleven suitable persons, citizens of Brooklyn (two of whom shall be physicians who shall constitute the Civil Service Commission of Brooklyn (hereinafter for brevity also called "the Commission") and each member of which shall be known as a Civil Service Commissioner of Brooklyn. Not more than six of the commissioners shall belong to the same political party; and no one of them shall be otherwise in the employ of the city. Each commissioner shall, before entering upon the discharge of his duties, take and file with the city clerk an oath in the general form prescribed for other city officers.

The mayor may at any time, by filing with the city clerk a written notification of the change, employ another citizen in the place of any one so employed who shall thereupon cease to be such commissioner. The commissioners shall serve without pay.

The commissioners shall from their number choose a chairman to act during their pleasure; and they may from time to time, subject to the approval of the mayor, designate committees from their own number to conduct any of the various examinations and classes of examinations. The schedule of rating of candidates and the certificate or certificates upon each examination and of recommendation, shall be signed by the committee, if any, conducting the examination, and by the chairman of the Commission. During the absence or inability to act of the chairman, a temporary chairman chosen by the Commission from their own number may in all respects act as chairman.

The mayor will detail or employ a clerk, who shall act as the secretary of the Commission.

The Commission may employ assistant examiners or experts, and may otherwise incur expenses not to exceed, in the aggregate, fifteen hundred dollars per annum.

It shall be the duty of the Commission to conduct all examinations held under these regulations, and to ascertain the fitness of candidates for the service of the city in respect of character, knowledge and ability for the branch of the service into which they seek to enter, and to estimate and determine the relative excellence or standing of the persons examined, and to certify the same as here prescribed.

The secretary of the commission shall, under the direction of the commission, keep minutes of their proceedings, and all necessary records of applicants, the examinations and standings, and a complete record of all persons employed in the several departments to which these rules apply, and of all appointments, promotions, dismissals, resignations and changes of any sort therein. When not in attendance upon the commission, the secretary will act under the direction of the mayor. All official action taken by the mayor under these regulations shall be recorded in writing under his own signature, and shall be filed among the papers of the commission.

Regulation 5.

For thirty days after the qualification of any new officer or head of department, he shall be at liberty to make dismissals from his clerical force throughout all the schedules, except where prohibited by law; but all such dismissals shall be certified by him within five days to the commission herein provided for, as well as to the city clerk as now provided by law. [Section 7, chapter 377, Laws 1880.] After thirty days from his qualification, an official, when making a dismissal, shall file his reason for such action with the commission as well as with the city clerk. Every change in the municipal service shall be reported in writing within five days to the commission by the official in whose department the change takes place.

Regulation 6.

Appointments to positions in Schedule A may be made without examination; but the appointing officer shall file with the secretary of the commission, within five days after making any such appointment, a formal notification thereof in writing, setting forth the full name of such appointee; date and place of birth; length of residence in Brooklyn; nature of previous employment; whether he has ever been in official service before, and if so, when and where; date of beginning of service and term for which appointed; a specific description of the duties of the position; salary; name of person in whose place appointed, and such other statistical information as the commission may deem proper for registration: the same to be duly certified by the appointing officer.

In these regulations the term "appointing officer" shall be construed to include any person, board or commission having the power to appoint to any position not excepted from these regulations in the Civil Service of Brooklyn.

Regulation 7.

Subject only to the limitations imposed by these regulations, the power of appointment and the responsibility of selection, and of ascertaining the character of the appointee are in all cases in the appointing officer. The power to remove (existing by law) on the part of any officer is not impaired by any thing contained in these regulations.

Regulation 8.

Every vacancy in Schedule B not filled by promotion shall be filled by selection from those who have passed highest in open competitive examinations, subject to the conditions expressed in the following regulations.

Regulation 9.

Applications of competitors for positions included in Schedule B must be addressed to the "Secretary of the Civil Service Commission, City Hall, Brooklyn, N. Y.," and must be accompanied by the following papers:

FIRST. The affidavit of the applicant that he is a citizen of the United States, giving his address and stating the place, street and number of his residence for the last preceding year, his age and place of birth; the extent, place and nature of his education, and also of his business training and experience, and whether he has ever been in official service before, and if so, when and where; and also whether he were honorably discharged from the military or naval service of the United States — in such case the discharge or a duly authenticated copy thereof to be submitted with the application.

SECOND. The certificates of not less than three or more than five reputable citizens of Brooklyn, each certifying that he individually has been personally acquainted with the applicant for at least one year, and believes him to be of good moral character, of temperate and industrious habits, and in all respects fit for the service he wishes to enter, and that such citizen is willing that his certificate should be published for public information.

In case the applicant reside out of Brooklyn, two of the citizens making such certificates may be residents of the applicant's place of residence.

THIRD. The certificate of a practicing physician, in good standing, that he has examined the applicant and found him free from any disease or physical defect that would impair his ability to render good and faithful service to the city.

Regulation 10.

Defective applications will be suspended, and applicants notified to amend the same; but no such notice will be given or opportunity granted a second time. Whenever the application does not show that the applicant is within the prescribed limits of age, and is otherwise qualified under the regulations, the application will be rejected.

Regulation 11.

Registers of all applicants shall be kept by the secretary of the Commission. When the applicants on a register for any one position, or for several positions for which one examination may be had, are in excess of such number as can be examined conveniently on the same day, the applicants will be notified to appear for examination in their order on the register.

Regulation 12.

All applicants for appointment in the police department as patrolmen, door-men and bridgekeepers—that is to say, in Schedule B, Class 8, Grade A—will be listed as follows, viz.: The first list will include only those who:

FIRST. Have been citizens of the United States and residents of Brooklyn at least four years next prior to the date of their application.

SECOND. Are not less than twenty-six, or more than thirty years of age.

THIRD. Are not less than five feet eight inches or more than six feet three inches in height, and whose weight and chest measurement shall be certified by the department surgeons to conform to height as per following table:

	Weight must be not less than	Average chest measurement to be not less than the fol- lowing, and to have ex- pansion
For height of 5 ft. 8 in.....	140 lbs.	34 in.
For height of 5 ft. 9 in.....	145 lbs.	34 1-2 in.
For height of 5 ft. 10 in.....	150 lbs.	35 in.
For height of 5 ft. 11 in.....	155 lbs.	35 1-2 in.
For height of 6 ft.	160 lbs.	36 in.
For height of 6 ft. 1 in.....	165 lbs.	36 1-2 in.
For height of 6 ft. 2 in.....	170 lbs.	37 in.
For height of 6 ft. 3 in.....	175 lbs.	37 1-2 in.

FOURTH. Have certificates of character and habits, satisfactory to the commission; and

FIFTH. Are certified to by the surgeons of the department as being of good health and sound body and mind, and without hereditary tendency to any disease liable to impair their usefulness as patrolmen.

The second list will include those who:

FIRST. Are citizens of the United States and have been residents of Brooklyn at least two years next prior to the date of their application.

SECOND. Who are not less than twenty-one or more than thirty years of age and whose stature, physique, character, and other qualifications, are as required by paragraphs three, four and five above for the first list.

Applicants in the first list will be first summoned for examination. If a sufficient eligible list be formed therefrom, applicants in the second list will not be summoned; but if not, then applicants in the second list will be summoned for examination.

This regulation shall not contravene the provisions of the statute, as stated in regulation 22, with relation to soldiers and sailors of the late war, honorably discharged.

Regulation 13.

Before an appointment as required by regulation 25 upon the uniformed fire force (Schedule B, Class 9,) is definitely made, the fire commissioner may require that the person whom he contemplates appointing of those certified to him from the eligible list, shall serve without pay for a period not exceeding ten days in the repair shop of the fire department or with some fire company. And, if at the end of such period the fire commissioner, from the report of the officer in charge of the repair shop, or company, or from other trustworthy information, becomes satisfied that such person is incompetent for the duties of the position to be filled, the fire commissioner may in such case refuse to such person an appointment as provided in regulation 25. Without the consent of the fire commissioner such person shall not again be certified to him for appointment.

The fire commissioner when he needs at one time to make several appointments may require the commission to certify to him from the eligible list for appointment names exceeding by two in number the number of appointments to be made. In all other cases the commission will certify in response to the application of the fire commissioner in accordance with regulation 19.

Regulation 14.

Applicants for the positions included in Schedule B, Classes 12, 13 and 14, as shown in Appendix E, must, in addition to the requirements hereinbefore mentioned, present satisfactory evidence, as follows:

FIRST. If the position to be filled be that of sanitary inspector (Class 12), that the applicant is duly authorized by the laws of the State of New York to practice medicine and surgery.

SECOND. If the position to be filled be that of chemist (Class 13), that the applicant has received the degree of Bachelor of Sciences, or its equivalent, from some institution duly authorized by law to confer such degree.

THIRD. If the position to be filled be that of Veterinary Inspector (Class 14), that the applicant has received the degree of Doctor of Veterinary Surgery, or its equivalent, from some institution duly authorized by law to confer such degree.

Regulation 15.

Whenever any vacancy occurs in the position of Sanitary Inspector (Schedule B, Class 12, Grade B), it shall be filled by the promotion of the Assistant Sanitary Inspector, who has been longest in the service of the department, and will reside within the district where the vacancy exists.

Regulation 16.

The Commission shall not permit the fact that any applicant is authorized to practice his profession by one school of medicine, rather than another, to have any influence in deciding his standing.

Regulation 17.

An eligible list shall be prepared by the Commission from time to time, as the needs of the service require upon competitive examinations for each of the different grades of every class in Schedule B, as shown in Appendix E. Upon each eligible list shall be placed only such persons as have been found by the Commission to be duly qualified for the positions for which such eligible list is prepared. The candidate shall be placed upon the eligible list in the order of merit as shown by the respective percentages of their aggregate markings upon their examinations, excepting that where the candidate has been honorably discharged from the military or naval service of the United States in the late war, he shall be preferred over other candidates equal in rating with himself. Where an examination for any grade is had before the eligible list for that grade is exhausted, a new eligible list shall be prepared after such examination, to take the place of the former eligible list. The persons upon the former eligible list who have not been examined for the new eligible list shall, unless a period of two years from the date of their original examination has elapsed, be respectively placed upon

the new eligible list in the position to which the percentages of their aggregate markings upon their former examinations would entitle them, if such markings had instead been given them upon the new examination. After remaining two years from the date of his examination eligible to appointment, the name of any person shall be stricken from the eligible list.

Regulation 18.

The actual conduct of every examination shall be under the responsible direction of the Commission or of its designated members, free from the interference or participation or influence of the appointing officer, or of any person other than assistant examiners or experts directly employed by the Commission. All examinations shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of that service to which they seek to be appointed. Excepting as these regulations otherwise provide, the Commission may, in the examinations, give such relative importance to the different subjects or matters of examination, whether mental or physical, or to experience, occupation or training, as to them may seem fit. The Commission or its members conducting any examination shall fix as to such examination a minimum general rating not below 70 per cent of the maximum; and any applicant receiving less than such minimum shall not be placed upon the eligible list. At or before the commencement of every examination, the weight to be given to every subject included in the examination and the general or average minimum and the minimum, if any, allowable upon each subject, shall be announced to the applicants. The appointing officer may prescribe to the Commission, and upon their request, he shall state to the Commission, so far as is consistent with these regulations, the general qualifications or attainments, physical or mental, or both, and the experience he deems necessary or proper to be possessed by the persons filling the position for which an eligible list is to be formed, and also of what age such persons should be.

Physical examinations of applicants for positions in the uniformed police force (Schedule B, Class 8,) shall, under the authority and supervision of the commission, be conducted by the surgeons of the police department or any of them. Physical examinations of applicants for positions in the uniformed fire force (Schedule B, Class 9), shall, under the authority and supervision of the commission, be conducted by the surgeons of the fire department or any of them. The surgeons of those departments so acting shall not be entitled to compensation beyond their salaries, the services rendered upon such examinations being deemed part of their official duties as surgeons in such departments. If, however, in any case of the physical examination of applicants for positions in the uniformed police or fire force the commission deem it necessary or proper, they may, with the approval of the mayor, employ for the conduct of such examinations, physicians or surgeons not in those departments.

Regulation 19.

Whenever a vacancy shall occur in a position within any grade of any class in Schedule B which in the opinion of the appointing officer the welfare of the city requires to be filled, and where under these regulations the appointing officer cannot himself fill such vacancy by promotion, the appointing officer shall notify the commission of the vacancy. The commission, thereupon, and in every case where an appointing officer shall notify the commission of a vacancy in any position within any grade of any class in Schedule B, shall as soon as practicable certify to the appointing officer for appointment from the eligible list appropriate to such position as it may then exist, the three persons having the highest standing on such eligible list, indicating such of them, if any, as have been honorably discharged from the military or naval service of the United States in the late war. The certificate of the commission shall state the percentage of the maximum obtained by each of the three persons on his examination, and the names and addresses of the citizens certifying to his character and habits. The appointing officer shall, thereupon, appoint to the vacant position, one of the three persons so certified to him by the commission, and shall at once

notify the commission of the appointment; excepting, however, that in the uniformed fire force, the appointment shall not be made until after the temporary service without pay for a period not exceeding ten days as provided in regulation 13, if such temporary service be required by the fire commissioners.

Where an eligible list is exhausted except as to one or two candidates, the commission may, in its discretion, certify such remaining one or two candidates without waiting to enlarge the eligible list by further examination, unless the appointing officer require that three names be presented to him. In such case the commission must forthwith hold a further examination so as to be able to certify three candidates.

Regulation 20.

If the appointing officer shall require in any position within Class 1 of Schedule B attainment in one or more especial subjects designated by him, the commission shall return from the eligible list of persons for positions in such class the names of the three persons whose standing is the highest in the especial subjects so designated, and the vacancy shall be filled by the appointment of one of those three persons; but the commission may at any time hold a competitive examination to fill a vacancy in a position in such class requiring such attainments in one or more of the especial subjects, if in the judgment of the appointing officer no one upon the eligible list is well qualified to fill the vacant position. In such case the appointment shall be given to one of the three passing highest in the competition; and an eligible list for such position and for like positions shall be made from such competitive examination, and shall from time to time be replenished from like examinations.

Regulation 21.

Priority of date in examination will give no advantage; the names of the three eligible persons standing highest will be certified for appointment without regard to dates when examined.

No person on an eligible list shall be certified for appointment more than three times to the same appointing officer, except at the latter's request; nor shall the name of any person remain on an eligible list more than two years from the date of the original examination.

Upon receiving a temporary appointment or an appointment to position temporary in its character, the candidate's name shall be, during the time he holds such appointment, suspended from the eligible list from which he is appointed.

Where the employment of a person in any grade of Schedule B is terminated because the work upon which he is engaged is suspended, and the head of the department so certifies to the commission, and further certifies that such person has faithfully and satisfactorily performed the duties of his position during his employment (which certificate the head of the department shall give in proper cases), then the person shall thereupon resume upon the eligible list from which he was appointed the position thereon to which his original marking or rating entitled him, and may be thereafter certified for appointment in all respects as if he had been placed upon such eligible list on the date of such former termination of his employment, the two years provided in regulation 27, and in this regulation not to be deemed to begin until such date.

Upon receiving a permanent appointment to a position permanent in its character, the candidate's name shall be stricken from the eligible list from which he is appointed.

Regulation 22.

Persons who have been honorably discharged from service in the army or navy of the United States, in the late war, shall be preferred for appointments to positions in the Civil Service, over other persons of equal standing as ascertained under these rules, and the person thus preferred shall not be disqualified from holding any position in the Civil Service, on account of his age or by reason of any physical disability, provided such disability does not render him incompetent to perform the duties of the position applied for. [§ 4, Chap. 410, Laws 1884.]

Regulation 23.

If the rate of compensation for a position within any grade of Schedule B be increased beyond the rate or limit of rate of compensation for that grade as specified in Appendix E, the position, by virtue of such increase, shall be deemed placed in the grade in the same class of Schedule B, which contains positions entitled to the compensation as so increased; and the person holding the position in the former grade shall not be transferred with or to the position when so placed in the higher grade, unless he be promoted in pursuance of these regulations. But nothing in these regulations contained, in cases where in the judgment of any appointing officer, by reason of increase in efficiency or merit, or by reason of length of service, the compensation of any person holding such a position in any grade of Schedule B ought to be increased, shall prevent such appointing officer from making such increase within the limit of the maximum so specified for such grade.

Nor shall any thing in these regulations be deemed to prevent an increase of salary by virtue of length of service where such increase is provided by law.

Regulation 24.

Where a person upon an eligible list shall decline to accept an appointment, whether temporary or permanent, to a position permanent in its nature, and upon request of the commission shall not explain such declination satisfactorily to the commission, the commission may strike his name from the eligible list.

Regulation 25.

All appointments to positions within Schedule B, except upon the uniformed police force and upon the uniformed fire force, shall be upon a probationary term of two months. Any one failing to receive permanent appointment (the position itself being permanent), for good cause, at the end of two months, shall be ineligible for one year for a new examination for the same position under these regulations. It shall be the duty of the appointing officer refusing such permanent appointment at the end of a probationary term, to certify to the commission the cause of his refusal, in order that the commission may decide whether the person to whom he has refused such permanent appointment be so ineligible for one year.

Regulation 26.

All new or omitted positions shall be deemed to be in Schedule B, as provided in regulation 2, unless the assignment of such positions to some other schedule be made by the mayor. To procure such an assignment to Schedule A, application must be made to the mayor in writing by the appointing officer before making any appointment, and the assignment shall be made in writing by the mayor in a communication to the Civil Service Commission. Unless such application to the mayor be made by the appointing officer in advance of the appointment, there shall be no transfer to Schedule A, except by amendment in due form of these regulations.

No temporary appointment to a position within Schedule B shall be made of any one not eligible for permanent appointment, excepting that in case of exigency, upon the certificate of the chairman of the commission that there are no candidates upon an eligible list for the position, and with the approval of the mayor such temporary appointment may be made, and the appointee may hold office thereunder until an eligible list is prepared, and such eligible list shall thereupon be forthwith prepared, and the position shall then be filled from such eligible list.

In the event of the appointment of special patrolmen, pursuant to the provisions of the city charter, such special patrolmen may be appointed without examination and without reference to the qualifications laid down in these regulations.

Regulation 27.

All appointments made under these regulations shall be published at least

once in the corporation newspapers, together with the names, in each instance, of the citizens certifying the good character of each appointee.

Regulation 28.

Transfers of persons included in the same grade of any class in Schedule B may be made from one office or department to another, by the mutual consent of the heads of such offices or departments, providing that the annual rate of compensation in the place to which the person is transferred shall not exceed the annual rate of compensation applicable to that grade. Every such transfer must be reported to the Commission for record within five days from the date thereof. No transfer will be permitted from a position enumerated in any class within Schedule B to a position enumerated in any other class within Schedule B, or from Schedule A or Schedule D to any position in Schedule B, except by virtue of the application, examination and other proceedings which are in these regulations prescribed for admission to the position to which the transfer is to be made.

Regulation 29.

All new positions other than of laborers or day workmen, created at any time by the needs of the service in any department, must be filled by competitive examination, unless the Mayor shall, in accordance with regulation 26, place such positions in Schedule A. Nothing herein contained shall, however, prevent the Commissioner of Police and Excise from detailing members of the uniformed police force to such duties, in his department, as in his opinion they may advantageously perform; or the Commissioner of the Fire Department from detailing members of the uniformed fire force to such duties in his department, as in his opinion they may advantageously perform.

Regulation 30.

Every false statement knowingly made by any person in his application for examination, and every connivance by him at any false statement made in any certificate which may accompany his application, or willful complicity in any fraud designed to improve his standing upon examination, shall be good cause for refusing such person an examination or any rating upon an examination, or for striking his name from any eligible list, or for the removal of such person from any position to which he may have been appointed.

Regulation 31.

No one dismissed from the service for misconduct, whether prior or subsequent to the promulgation of these regulations, shall be admitted to examination for appointment in any capacity in any department of the municipal service within two years from the date of dismissal.

Regulation 32.

No recommendation or question under the authority of these regulations shall relate to the political opinions or affiliations of any person whatever; neither shall political opinions be discovered or considered by the Commission in their examinations, or considered by the appointing officer in determining his selection among candidates certified for appointment. The commission shall not receive or consider any communication as to the qualifications or merits of any candidate for a position except such as are herein permitted, and except such communications as they may invite by way of verification of statements made by the candidate.

No recommendation of any person who shall apply for office or place under these regulations, which may be given by any senator or member of assembly, or officer confirmed by the senate, or judge of any court, except as to the character or residence of the applicant, shall be received or considered by any person concerned in making any examination or appointment under these regulations. [§ 9, Chap. 354, Laws of 1883.]

Regulation 33.

No promotion from one grade to a higher grade of the same class in Schedule B shall be made, except with the consent of the mayor, without examination, until after the person promoted has for at least six months occupied the position in the lower grade. No promotion or transfer shall be made from one class to another in Schedule B otherwise than upon competitive examination.

Regulation 34.

No person shall be appointed or promoted to be a foreman in the uniformed fire force (Schedule B, Class 9, Grade C), who shall not have been a member of such uniformed force for at least two years immediately preceding such appointment. No person shall be appointed or promoted to be a district engineer in the fire force (Schedule B, Class 9, Grade D), who shall not have been a member of the uniformed force for at least four years immediately preceding such appointment, and in the last two years of which he shall have served in the grade next below that of district engineer.

Regulation 35.

Promotion shall not take place from one grade to a higher grade in the following classes of Schedule B, except upon merit and a competitive examination, which examination may, in the discretion of the appointing officer, be conducted by appropriate subordinates in his department to be designated by him. In such case, the forms and procedure of examinations, the preparation of eligible lists and the certifying of names therefrom by the examiners shall, as nearly as practicable, be similar to those employed by the Commission in similar cases.

CLASS 1 — Clerical, book-keeping and like positions.

CLASS 8 — Uniformed police force.

CLASS 9 — Uniformed fire force.

In determining such merit and upon such competitive examination for promotion, especial weight shall be given by the Commission or examiners, so far as is practicable, to the merit of the work done by the applicant in the position from which he seeks promotion, and in weighing such merit, length of service may be considered. Such merit shall be determined from the records and papers of the office or position in which he has been employed, so far as they show his diligence, punctuality, steadiness, and other merit; and from his work in such office or position so far as it remains or can be inspected; and from such other evidence of such merit as the Commission or examiners may deem it proper to consider.

Except as herein otherwise provided or limited, promotions from one grade to another grade in any other class of Schedule B rest with the appointing officer, who shall make the promotions upon the basis of merit, of which he shall be the sole judge from his knowledge of the applicants in the positions in which they may have theretofore served, excepting, however, that the appointing officer may, if he please, open the promotion to competitive examination under the direction of the Commission. In the latter case competitive examination for promotion, unless otherwise directed by the appointing officer, shall be limited to the persons in the grade next below the grade to which the promotion is to be made. Excepting in respect to this limitation, the same rules heretofore prescribed for competitive examinations, for eligible lists and for appointments therefrom in Schedule B shall apply to competitive examinations for promotions.

Regulation 36.

It shall be the duty of the commission at the beginning of every calendar year commencing with 1888, to prepare the Civil List of Brooklyn for the year. That list shall contain the name of every person in the employ of Brooklyn, or receiving compensation from the city on the first day of January, together with the

title of his office, the salary or compensation thereto attached, a brief specification of the duties of the office, whether the office be elective or appointive, and if appointive, then by whom the appointment is made, and the term, if any, of the office. The Civil List shall be filed in the office of the commission as one of its records.

The persons entered upon the Civil List (whether on 1st January, or during the year), shall be thereon classified as follows: First, persons holding positions not within the operation of these regulations; second, persons holding positions in Schedule A; third, persons holding positions in Schedule B; fourth, persons holding positions in Schedule D; fifth, persons receiving compensation from the city, but subject to the Civil Service regulations of the State. The persons holding positions in each of the said three Schedules A, B and D, shall in the Civil List be numbered in such class, there being a separate numbering for each class.

No payment of salary or compensation shall after 1st February, 1885, be made to any person holding a position in either of the Schedules A, B and D, unless his name be upon the Civil List, and unless the requisition or warrant for such payment show the schedule and schedule number of such person appearing upon the Civil List. This, however, shall not prevent the payment of laborers or day workmen not yet upon the Civil List, whose pending employment has commenced not more than one month before the payment.

No payment shall be made by the city or any of its officers to a person holding a position subject to the Civil Service regulations of the State, and the laws in pursuance of which the same were made, until it appears that his appointment was made before such regulations took effect or has been made agreeably to the same.

Every appointment made on or after the first day of January in each year shall be immediately entered upon the Civil List, under the proper division, and a number assigned thereon to the appointee. And every death, resignation, removal or promotion of any person, whose name is on the Civil List, shall be noted thereon.

It shall be the duty of every officer of the city to render to the commission every proper assistance in the preparation of the Civil List.

Regulation 37.

The commission shall have power to correct any error and amend any schedule, list, or other paper or record, where it appears that any error or injustice has been done, provided, however, that after an eligible list is prepared and certified, it shall not be altered except upon notice, by mail or otherwise, as the commission may direct, to all persons whose standing will be unfavorably affected by the alteration.

Regulation 38.

In case any appointing officer shall become satisfied that the character or reputation of any person on an eligible list is such as to make it unfit or improper to appoint him to a position in the Civil Service of Brooklyn, he shall so state to the commission. And the commission shall have power, in every case where they are satisfied that the character or reputation of any applicant for a position or any person on an eligible list is such as to make his appointment to a position in the Civil Service unfit or improper, to strike the name of such person from the roll of persons for examination, or from an eligible list, providing that before they shall so strike his name from such roll or list, they shall advise him of the general grounds upon which they are about to proceed, that he may make such explanation as he may deem proper; but nothing in this regulation shall be so construed as to give to any person the right to a proceeding in the nature of a trial before the commission.

Regulation 39.

No examination, eligible list, certificate or proceeding of the commission shall be prejudiced or affected by reason of any omission, informality or irregularity relating to any application or examination thereon, unless the person

complaining or aggrieved shall notify the commission prior to the completion of the examination of such omission, informality or irregularity, and unless after such notice the commission shall determine such omission, informality or irregularity to be material.

Regulation 40.

All the schedules, eligible lists, examination papers, minutes and other papers, memoranda and records of the commission shall be public and open to the inspection of any citizen upon reasonable application. And it shall be the duty of the secretary of the commission, upon tender of the cost of making the copies, to furnish to any citizen certified copies of any of the said schedules, lists, examination papers, minutes, papers, memoranda or records; provided, however, that the papers, memoranda and other records relating to any particular examination shall not be made public until after the eligible list upon such examination is prepared and certified.

Regulation 41.

No person in the public service is, for that reason, under any obligation to contribute to any political fund or purpose, or to render any political service, and no person shall be removed or otherwise prejudiced for refusing so to do.

Regulation 42.

No person in the public service has the right to use his official authority or influence to coerce the political action of any person or body.

Regulation 43.

The regulations for admission to the Civil Service of the city of Brooklyn and to any branch thereof heretofore prescribed or established, and the appointment of examiners thereunder made are hereby annulled and withdrawn; providing, however, that nothing herein contained shall affect any examination heretofore held, or any grading had thereunder, or any eligible list heretofore formed, or any appointment heretofore duly made in pursuance of such regulations hereby annulled; and every eligible list duly formed under such regulations shall in all respects be deemed to be formed under the foregoing regulations, and to be an eligible list for the class specified in Appendix E most nearly resembling the same. All applications for examination for admission into any of the departments of the city government, heretofore duly filed, shall likewise be unaffected by these regulations, and shall be considered as duly made hereunder.

APPENDIX A.

EXCEPTED POSITIONS.

The mayor; the members of the board of aldermen; the comptroller; the auditor; the city treasurer; the collector; the registrar of arrears; the counsel to the corporation; the president of the board of assessment; the assessors; the commissioner of police and excise; the excise commissioners; the police justices; the commissioner of health; the fire commissioner; the commissioner of buildings; the commissioner of city works; the president of the Brooklyn park commissioners; the Brooklyn park commissioners; all officers, members and employes of or under the board of education, and those who seek to enter the public service thereunder; the members of the board of elections; the city clerk; experts and special inspectors appointed in emergencies by the commissioner of health, in accordance with regulation 2.

APPENDIX B.

POSITIONS IN SCHEDULE A.

Mayor's Office.

Private secretary ; assistant secretary, and secretary to the civil service commissioners.

Board of Aldermen.

Clerks ; messenger ; sergeants-at-arms.

Department of Finance.

Deputy comptroller ; bond clerk ; coupon clerk ; superintendent at Wallabout ; clerk of accounts ; book-keeper ; warrant clerk ; salary warrant clerk ; assessment clerk ; dockmasters having custody of money.

Department of Audit.

Deputy auditor.

Treasury Department.

Deputy treasurer.

Department of Collection.

Deputy collector ; assistant cashier ; two stamp clerks.

Department of Arrears.

Deputy registrar ; cashier.

Department of Law.

Assistants to the counsel to the corporation.

Department of Assessment.

Secretary.

Department of Police and Excise.

Deputy commissioner ; counsel ; fire marshal ; superintendent of steam boilers ; excise cashier ; superintendent ; inspector ; drill captain ; searcher female prisoners.

Department of Health.

Deputy ; counsel ; secretary.

Department of Fire.

Deputy commissioner ; superintendent of repair shops ; chief engineer ; assistant chief engineer ; janitrix.

Department of Buildings.

Deputy commissioner.

Department of City Works.

Commissioners' Office — Deputy commissioner ; secretary ; clerk to commissioner ; chief accountant.

Engineers' Bureau — Chief engineer ; first assistant engineer ; assistant engineers ; consulting engineer.

Bureau of Extension and Distribution — Water purveyor ; deputy water purveyor.

Bureau of Water Rates — The registrar ; the chief clerk.

Bureau of Sewers — Superintendent.

Bureau of Streets — Superintendent of streets ; general superintendent of street repairs.

Bureau of Supplies — Superintendent.

Department of Parks.

Secretary ; chief engineer.

City Clerk's Office.

Deputy city clerk ; license clerk.

Board of Elections.

Clerks.

City Hall.

Keeper ; assistant keeper.

The Civil Service Commissioners and Examiners.

Sealers of Weights and Measures.

APPENDIX C.**POSITIONS IN SCHEDULE B.****Mayor's Office.**

One temporary clerk.

Department of Finance.

Clerks, except assessment clerk, warrant clerk, salary warrant clerk and coupon clerk ; one messenger ; one clerk at Wallabout ; dockmasters not having custody of money.

Department of Audit.

One chief clerk ; clerks ; one book-keeper ; one messenger.

Board of Audit.

One accountant ; clerks:

Department of Collection.

One chief clerk ; clerks ; messengers.

Department of Arrears.

Book-keeper ; clerks.

Department of Law.

One law clerk ; clerks ; one stenographer ; one searcher ; one constable.

Department of Assessment.

Clerks ; one messenger.

Department of Police and Excise.

One deputy chief clerk ; one accountant ; one property clerk ; one superintendent clerk ; one stenographer ; surgeons ; one telegraph superintendent ; telegraph operators ; telegraph linemen ; inspectors steam boilers ; one clerk to inspectors ; one excise secretary ; clerks ; one messenger ; captains ; sergeants ; detectives ; roundsmen ; patrolmen ; doormen ; bridge keepers.

First District Police Court.

Clerks ; one interpreter.

Second District Police Court.

One clerk ; one interpreter.

Third District Police Court.

One clerk ; one interpreter.

Police Court (City Hall).

Clerks.

Department of Health.

One register ; clerks ; sanitary inspectors ; assistant inspectors ; special vaccinators ; one chemist ; one meat inspector ; one special inspector ; one veterinary inspector ; inspectors of plumbing ; one messenger ; one driver.

Department of Fire.

One surgeon ; one assistant surgeon ; one veterinary surgeon ; one superintendent of supplies ; one book-keeper ; one clerk to chief engineer ; one hostler ; one superintendent of telegraph ; one inspector of telegraph ; one telegraph operator ; one blacksmith ; wheelwrights ; blacksmith's helpers ; one watchman ; general helpers ; one helper ; bell ringers , district engineers ; foremen ; engineers ; driver ; firemen.

Department of Buildings.

Clerks ; inspectors.

City Clerk's Office.

Two clerks ; one clerk ; two clerks ; one clerk.

Department of City Works.

Commissioner's Office — One book-keeper ; one messenger.

Engineer's Bureau — Chief clerk ; clerks ; architect and draughtsman ; draughtsmen ; levelers ; rodmen ; inspectors ; foremen ; engineers ; assistant engineers ; one keeper new reservoir ; clerk and telegrapher.

Bureau of Extension and Distribution — One surveyor ; one accountant ; one meter clerk ; one permit clerk ; one assistant clerk and messenger ; one clerk of resurvey ; inspectors of resurvey ; one inspector of manufactories ; one meter inspector ; inspectors of taps and connection ; inspectors of plumbing ; inspectors of water for shipping ; inspectors of extra water and cut off ; one inspector at foundry for nine months of year ; inspectors of pipe laying ; one assistant inspector of pipe laying ; one keeper of pipe yard ; keeper of P. H. reservoir ; one tapper ; one foreman repairs west dist. ; one foreman repairs east dist. ; one yard engineer ; machinists ; one carpenter ; valvemen ; one caulker ; one paver.

Bureau of Water Rates — One entry clerk ; bill clerks ; stamp and bill clerks ; one plumber's permit clerk ; temporary clerks.

Bureau of Sewers — One chief clerk ; one assessment clerk ; one assistant assessment clerk ; inspectors of connections ; district inspectors ; one draughtsman ; one foreman of repair yard ; one paver.

Bureau of Streets — One complaint clerk ; one permit clerk ; one gas clerk ; one messenger ; inspectors.

Bureau of supplies — One clerk.

Department of Parks.

Clerks ; one general foreman ; one draughtsman ; tinsmiths ; one head-keeper ; sergeants ; station officers ; one head carpenter ; foremen ; one mechanical engineer ; keepers.

Truant Home.

One superintendent ; physician ; teachers ; farmer ; watchmen.

Public Baths.

Keepers ; watchmen.

Dog Pound.

One keeper.

City Hall.

Watchmen.

APPENDIX D.

POSITIONS IN SCHEDULE D.

Department of City Works.

Engineer's Bureau — Laborers ; teamsters ; rollers ; temporary laborers ; temporary mason helpers.

Water Purveyor's Bureau — Drivers of horses and carts ; teamsters ; laborers.

Bureau of Licenses — Drivers of horses and carts ; laborers.

Department of Parks.

Laborers.

City Hall.

Cleaners.

Municipal Building.

Cleaners.

Public Baths.

Matrons.

Dog Pound.

Assistant keeper ; dog-catchers.

Truant Home.

ooks ; laundress ; house maids ; seamstress ; matron.

APPENDIX E.

CLASSIFICATION OF POSITIONS IN SCHEDULE B, FOR THE PURPOSES OF EXAMINATION.

NOTE: Unless otherwise mentioned, the rate of compensation specified is the annual rate, or the limits of the annual rate, of compensation, at the date of these regulations. If the compensation be at a daily rate or other rate than an annual rate, or if the employment be for less than a year, then the rate or limit of rates given is the compensation which would be paid for a year, if the employe were employed for the entire year at the same daily or other rate.

1. Clerical, Book-keeping, and like positions.

Grade A — All clerks, book-keepers and like employes in all departments of the Civil Service (not in this appendix elsewhere classified), whose compensation is \$1,000 or less.

Grade B — All clerks, book-keepers and like employes in all departments of the Civil Service (not in this appendix elsewhere classified), whose compensation is more than \$1,000, but not exceeding \$1,250.

Grade C — All clerks, book keepers and like employes in all departments of the Civil Service (not in this appendix elsewhere classified), whose compensation is more than \$1,250, but not exceeding \$1,500.

Grade D — All clerks, book-keepers and like employes in all departments of the Civil Service (not in this appendix elsewhere classified), whose compensation is more than \$1,500, but not exceeding \$1,750.

Grade E — All clerks, book-keepers and like employes in all departments of the Civil Service (not in this appendix elsewhere classified), whose compensation is more than \$1,750, but not exceeding \$2,000.

Grade F — All clerks, book-keepers and like employes in all departments of the Civil Service (not in this appendix elsewhere classified), whose compensation is more than \$2,000.

Class 2. Dockmasters.

Grade A — Dockmasters not having custody of money, department of finance, \$1,000 or less.

Grade B — Dockmasters not having custody of money, department of finance, more than \$1,000.

Class 3. Law Clerks.

Grade A — One law clerk, first police court, \$1,200 ; one law clerk, police court (city hall), \$1,200.

Grade B — One law clerk, first district police court, \$1,800 ; one law clerk, second district police court, \$1,800 ; one law clerk, third district police court, \$1,800 ; one law clerk, police court (city hall), \$1,800.

Grade C — One law clerk, department of law, \$2,500.

Class 4. Stenographers.

Grade A — One stenographer, department of law, \$1,000 or less.

Grade B — One stenographer, police department, over \$1,000, but not over \$1,500.

Class 5. Searchers.

Grade A — One searcher, department of law, \$500.

Class 6. Interpreters.

Grade A — One interpreter, first district police court, \$375.

Grade B — One interpreter, second district police court, \$1,200 ; one interpreter, third district police court, \$1,200.

Class 7. Messengers and Constables.

Grade A — One messenger, health department ; one constable, law department ; and one messenger, bureau of streets, department city works, \$500 or less.

Grade B — One messenger, department of collection ; one messenger, department of assessment ; one messenger to commissioner city works, over \$500, but not exceeding \$900.

Grade C — One messenger, department of collection ; one messenger, police department ; one messenger and assistant clerk, bureau of extension, department city works, over \$900.

Class 8. Uniformed Police Force.

Grade A — Five hundred and fifty patrolmen, doormen and bridge-keepers, \$750 to \$1,000.

Grade B — Thirty-four roundsmen, \$1,100.

Grade C — Sixty-six sergeants, \$1,500.

Grade D — Thirteen captains, \$2,000. (Promotion from sergeants at pleasure of commissioner.)

Class 9. Uniformed Fire Force.

Grade A — Two hundred and twenty-one firemen, \$700 to \$1,000.

Grade B — Twenty engineers and twenty-five drivers, \$1,000.

Grade C — Twenty-six foremen, \$1,300.

Grade D — Six district engineers, \$2,000.

Class 10. Surgeons.

Grade A — One surgeon, fire department, \$1,000.

Grade B — Three surgeons, department of police, \$1,250.

Grade C — One surgeon, fire department, \$1,500.

Class 11. Special Vaccinators.

Grade A — Six special vaccinators, department of health, \$900.

Class 12. Sanitary Inspectors.

Grade A — Fourteen assistant sanitary inspectors, department of health, \$1,000.

Grade B — Three sanitary inspectors, department of health, \$1,350.

Class 13. Chemists.

Grade A — One chemist, department of health, \$900.

Class 14. Veterinary Surgeons.

Grade A — One veterinary surgeon, fire department, \$1,500 or less.

Class 15. Veterinary Inspectors.

Grade A — One veterinary inspector, department of health, \$900.

Class 16. Meat Inspectors.

Grade A — One meat inspector, department of health, \$900.

Class 17. Draughtsmen.

Grade A — One draughtsman, park department; two draughtsmen, engineer's bureau, department city works; one draughtsman, bureau of sewers, same department, \$1,500 or less.

Grade B — One architect and draughtsman, and one other draughtsman, engineer's bureau, department city works, over \$1,500.

Class 18. Levellers and Rodmen.

Grade A — Five rodmen, engineer's bureau, department city works, \$1,000 and less.

Grade B — Three levellers, same bureau, over \$1,000, but less than \$1,600.

Class 19. Inspectors of General Construction.

Grade A — One inspector construction and repairs of piers, etc., engineer's bureau, department city works; one inspector water construction, new buildings at stations, etc., same bureau; one inspector repairs to pumps, filling wells, laying cross-walks, etc., same bureau; one inspector repairing streets torn up by gas companies, same bureau; one inspector paving and cleaning railroad streets between tracks, same bureau, \$1,800 and less.

Class 20. Inspectors and Surveyors of Sewer Construction.

Grade A — Three inspectors sewer construction, engineer's bureau, department city works; four district inspectors bureau of sewers, same department; two inspectors of pipe laying, bureau of extension, same department; one assistant inspector of pipe laying, same bureau, \$1,800 and less.

Grade B — One surveyor, bureau of extension, department city works, \$1,500.

Class 21. Water Inspectors.

Grade A — Two inspectors of resurvey, bureau of extension, department city works; one inspector water for shipping, same bureau; two inspectors extension water and cut-off, same bureau, \$1,100 and less.

Grade B — One inspector of manufactories, bureau of extension, department city works; eighty-one meter inspectors, same bureau.

Class 22. Inspectors of Connections.

Grade A — Three inspectors of connections, bureau of sewers, department city works; one caulker, bureau of extensions, same department, \$900 and less.

Grade B — Three inspectors of taps and connections, bureau of extension, department city works; one inspector of taps and connections, same bureau; one valvemen, same bureau, over \$900, but not over \$1,100.

Grade C — One tapper, bureau of extension, department city works, \$1,200.

Class 23. Inspectors of Plumbing.

Grade A — One special inspector, vaults, etc., department of health, \$900 or less.

Grade B — Five inspectors of plumbing, department of health; and two inspectors of plumbing, bureau of extension, department of city works, \$1,200 or less.

Class 24. Inspectors of Buildings.

Grade A — Twelve inspectors of buildings, department of buildings, \$1,200.

Class 25. Foundry Inspectors.

Grade A — One keeper of pipe yard, bureau of extension, department city works, \$900.

Grade B — One inspector at foundry, bureau of extension, department city works, \$1,800.

Class 26. Inspectors of Street Obstructions.

Grade A — One inspector of erection of telegraph poles, etc., bureau of streets, department city works; three inspectors of street cleaning, etc., same bureau, \$1,200.

Class 27. Inspectors of Lamps.

Grade A — One inspector of lamps, bureau of streets, department city works, \$1,000 and less.

Class 28. Inspectors of Coal.

Grade A — One inspector of coal, engineer's bureau, department city works, \$1,000 and less.

Class 29. Inspectors of Repairs to Baths.

Grade A — One inspector of repairing and painting public baths, engineer's bureau, department city works, \$1,000 and less.

Class 30. Superintendents of Supplies.

Grade A — One superintendent of supplies, fire department, \$1,500.

Class 31. Foremen and Superintendents of Repairs.

Grade A — Ten foremen on street repairs, engineer's bureau, department city works; one foreman on repairs to pond banks, etc., same bureau; two foremen, park department, \$1,000 or less.

Grade B — Three foremen on repairs to dangerous holes and repairing over water connections, etc., engineer's bureau, department city works; one foreman repair yard, sewer bureau, department city works; one keeper new reservoir, engineer's bureau, same department, over \$1,000, but not more than \$1,250.

Grade C — One general foreman, charge of parks, park department; one foreman repairs, western district and one foreman repairs eastern district, both bureau of extension, department city works, over \$1,250, but not exceeding \$1,700.

Grade D — One general superintendent repairs, engineer's bureau, department city works, \$1,700.

Class 32. Steam and Machine Engineers.

Grade A — One engineer charge of engine at repair shop, fire department; one engineer at well, park department; seven assistant engineers at pumping stations, engineer's bureau, department city works; one yard engineer, bureau of extension, same department, \$1,100, or less.

Grade B — Five engineers pumping stations, engineer's bureau, department city works; one assistant engineer at Mt. Prospect engine house, same bureau; eleven assistant engineers, running Ridgewood engines, same bureau; three inspectors steam boilers, police department, \$1,100 or more, but not exceeding \$1,400.

Grade C — One engineer, Mt. Prospect engine house, engineer's bureau, department city works; one assistant engineer, engines at Ridgewood, same bureau, over \$1,400, but not over \$1,800.

Grade D — One chief engineer in charge of Ridgewood engines, \$2,500.

Class 33. Machinists.

Grade A — Three machinists, bureau of extension, department city works, \$1,000 and less.

Class 34. Carpenters.

Grade A — One carpenter, bureau of extension, department city works, \$1,100 and less.

Grade B — One head carpenter, park department, over \$1,100, but under \$1,300.

Class 35. Wheelwrights.

Grade A — Two wheelwrights in fire department, \$1,000 or less.

Class 36. Tinsmiths.

Grade A — Two tinsmiths, park department, \$1,000 or less.

Class 37. Blacksmiths and Helpers.

Grade A — Three general helpers, fire department, \$600 and less.

Grade B — One blacksmith's helper or blacksmith, fire department, over \$600, but not over \$750.

Grade C — Two blacksmith's helpers or blacksmiths, fire department, over \$750, but less than \$1,000.

Grade D — One blacksmith, fire department, \$1,000 or over.

Class 38. Park Keepers and Watchmen.

Grade A — One watchman at repair shop, fire department, \$600 and less.

Grade B — Thirty-five park keepers, park department, over \$600, but under \$800.

Grade C — Two station officers and three sergeants, park department; one keeper P. H. reservoir, bureau of extension, department city works; watchmen at city hall, over \$750, but not exceeding \$900.

Grade D — One head keeper, park department, \$1,250 and over.

Class 39. Bell Ringers.

Grade A — Twelve bell ringers, fire department, \$900.

Class 40. Drivers.

Grade A — One driver, health department; one hostler, fire department, \$600 and less.

Class 41. Pavers.

Grade A — One paver, bureau of extension, department of city works, \$1,100 and less.

Class 42. Truant Home Superintendents, Teachers, etc.

Grade A — One superintendent, \$1,200 and less.

Grade B — Two teachers, \$800 and less.

Grade C — One physician, \$400 and less; one farmer, \$400 and less.

Grade D — Two watchmen, \$600 and less.

Class 43. Bath Keepers and Watchmen.

Grade A — Three keepers, \$800 and less.

Grade B — Three watchmen, \$600 and less.

Class 44. Dog Pound Keepers.

Grade A — One keeper, \$800 and less.

SETH LOW,
Mayor

Seal of Mayors office,
Brooklyn.

THE NEW YORK CIVIL SERVICE COMMISSION, }
August 26, 1884. }

The foregoing Civil Service regulations of the city of Brooklyn are approved by the New York Civil Service Commission.

JOHN JAY,
President.

: Seal of the Civil Service Commission :
 : of the State of New York. :
 : :

CITY CLERK'S OFFICE, }
 BROOKLYN, *August 28, 1884.* }

I do hereby certify that the foregoing is a true copy of the original, approved by the New York Civil Service Commission, filed in this office on the 28th day of August, 1884, and of the whole of said original.

M. J. CUMMINGS,
Assistant City Clerk.

: Seal of the city :
 : of Brooklyn. :
 : :

APPENDIX F.

[The regulations for the following cities were based upon a suggested series prepared by the Commission and are therefore in most respects identical. Those for the city of Albany are printed in full and the changes in the others are indicated so as to avoid repetitions. All the Albany regulations are contained in those of the other cities except in cases where the omission is distinctly stated. These omissions change in many cases the special numbers of the subsequent regulations as compared with those for Albany, but the change of numbers is disregarded, the object of this publication being to give the substance of the regulations, which is accomplished in full by this plan without unnecessary repetition.]

ALBANY CITY CIVIL SERVICE REGULATIONS.

Pursuant to the statutes of this State, to regulate and improve the Civil Service thereof, I, A. Bleecker Banks, mayor of the city of Albany, hereby prescribe the following regulations for the admission of persons into the public service of the city of Albany, to take effect from the date of their approval by the New York Civil Service Commission :

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Albany, with the following exceptions, required by the statute, namely :

FIRST — Officers elected by the people, viz. : the mayor ; aldermen ; justices of the city court ; justices of the police court ; police commissioners ; school commissioners.

SECOND — The subordinates of any of such officers, for whose errors or violation of duty said officer is financially responsible ; mayor's first clerk.

THIRD — The head or heads of any department of the city government, viz. :

1. — Officers appointed by the mayor, viz. : assessors ; corporation counsel ; excise commissioners ; park commissioners.

2. — Officers appointed by the common council on the nomination of the mayor, viz.: city chamberlain; city engineer and surveyor; city physician; city marshal; inspector of weights and measures; overseer of the poor; receiver of taxes; street commissioner; superintendent of the alms-house.

3. — Officers elected by the common council, viz.: clerk of the common council; fire commissioners; members of the board of health; water commissioners.

FOURTH — Persons employed in or who seek to enter the educational department of the city.

FIFTH — Any subordinate officer who, by virtue of his office, has personal custody of public moneys or public securities, for the safe keeping of which the head of an office is under official bonds, viz.: assistant corporation counsel; deputy chamberlain; deputy receiver of taxes; deputy overseer of the poor.

Regulation 2.

No person in the public service is, for that reason, under any obligation to contribute to any political fund or purpose, or to render any political service, and no person shall be removed or otherwise prejudiced for refusing so to do.

Regulation 3.

No person in the public service has the right to use his official authority or influence to coerce the political action of any person or body.

Regulation 4.

The Civil Service of the city of Albany shall be classified as follows:

SCHEDULE A.

1. All deputies of officers and commissioners duly authorized by law to act for their principals, and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve.

2. Clerks of boards and commissions who are by law required to be members of boards and commissions on which they serve, viz.: secretary of the police commissioners; secretary of the fire commissioners.

3. Subordinate officers who, by virtue of their offices, have personal custody of public moneys, for the safe keeping of which the head of the office is under a special bond.

SCHEDULE B.

FIRST — Mayor's office: mayor's second clerk.

SECOND — Assessors' office: clerks.

THIRD — Chamberlain's office: clerks.

FOURTH — Office of the clerk of the common council: deputy clerk.

FIFTH — Engineering department: draughtsmen, rodmen.

SIXTH — Fire department: assistant engineers, supervising engineers, superintendent of fire-alarm telegraph, assistant superintendent of fire-alarm telegraph, operators of fire-alarm telegraph, janitors, superintendent hose depot, assistant superintendent hose depot, engineers of steamers, hosemen, ladder-men, drivers, foremen, firemen, tillermen, clerk to commission.

SEVENTH — Office of the overseer of the poor: assistant overseer of the poor, examiners.

EIGHTH — Police department: captains, sergeants, patrolmen, roundsmen, station-house keepers, court officers, detectives, clerks.

NINTH — Park department: head gardener, clerk.

TENTH — Receiver of taxes office: clerks.

ELEVENTH — Street department: superintendents of streets, clerks.

TWELFTH. Water department: secretary, clerks, chief engineer, assistants, firemen, coal passers, foremen, caulkers, tappers, watchmen, and others.

THIRTEENTH. The janitor of the city building: bell ringers, comers of deeds.

(Schedule B includes all clerks, copyists, recorders, stenographers, bookkeepers, and others rendering clerical services, and not included in Schedule A; all policemen, firemen, messengers, orderlies, court attendants, guards, and others in station-houses, and all persons employed or appointed in the police service and not specially included in Schedules A, C and D.)

SCHEDULE C.

1. Chief of police, chief engineer of the fire department, deputy engineer, surveyor, district physicians, engineer and secretary of park commission, superintendent of the water-works, surgeon of the police department, and surgeon of the fire department.

2. Schedule C includes all persons whose duties are strictly professional, and all persons who are employed in private business and occasionally render service for a nominal compensation.

SCHEDULE D.

FIRST. Park department: laborers.

SECOND. Street department: laborers, cartmen, teamsters.

THIRD. Water department: general laborers, day workmen.

FOURTH. Schedule D shall include all persons employed as laborers and day workmen.

Regulation 5.

The appointments to positions comprised in Schedule A may be made without examination under these regulations, but such examinations may be required at the request of the appointing officer. Appointing officers must notify in writing of all appointments to such positions within five days after they are made, setting forth the full name of such appointee, date and place of birth, length of residence in Albany, nature of previous employment, whether he has ever been in official service before, and if so, when and where, date of beginning of service and term for which appointed, salary, name of person by whom place appointed; the same to be duly certified by the appointing officer.

Regulation 6.

Appointments shall be made or employment shall be given in the positions comprised in Schedule B by selection from those persons graded highest as the result of competitive examinations, provided that vacancies in the higher positions of this schedule may be filled by the promotion of those holding lower positions who have passed an examination under these regulations. The competitive examinations shall be practical in their character, and with a paramount regard to matters which will fairly test the relative capacity and fitness of the persons examined for the service which they seek to enter. Applications of persons for positions included in Schedule B must be addressed to the secretary of the municipal service examining board, city hall, Albany, and the applicant must state therein, on oath, and in his own handwriting: 1, his full name, giving street and street number; 2, his term of residence in the city; 3, his citizenship; 4, his date of birth; 5, his place of birth; 6, his previous employment in the public service, if any; 7, his business or employment for the last five years; 8, the extent, place and nature of his education; 9, if in the military or naval service of the United States in the late war, give name of organization or vessel to which attached, date of enlistment or commission, position held, date and cause of discharge from the service, and any physical disability incurred in such service; 10, such other information may be furnished as the board may reasonably require, touching the applicant's fitness for the public service.

The application must be accompanied by a certificate of a practicing physician of good repute, that he has examined the applicant and found him free from any physical defect or disease that would be likely to interfere with the proper discharge of his duties in the position in the Civil Service sought by such applicant, and by the certificate of not less than three nor more than five reputable citizens of the city, that they have been personally acquainted with the applicant for at least one year, and believe him to be of good moral character, of temperate and industrious habits, and in all respects fit for the service which he wishes to enter, and that they are willing that such certificate shall be published for public information, and will, upon application, give such further testimonials in regard to such applicant as may be required. The applicant must also state in his application the position he seeks.

Regulation 7.

Defective applications will be suspended, and applicants notified to amend the same; but no such notice will be given or opportunity granted a second time. The date of the reception of all applications shall be indorsed thereon and entered of record, and if the applicants for admission are in excess of the number that can be examined at a single examination, they will be notified to appear in their order on the respective records.

Regulation 8.

For the purpose of ascertaining the qualifications of persons seeking or named for positions in the departments and offices of the municipal government, to which these regulations apply, there shall be two boards of examiners, namely: One for all positions in Schedule B, and one for all positions in Schedule C. Each of such boards shall be composed of three citizens of Albany, designated by the mayor, and not more than two of whom shall belong to the same political party. The mayor may at any time substitute another citizen in the place of any one so designated, by filing with the city clerk a written notification of such change, and will detail or employ a clerk who shall act as the secretary of the examining boards. It shall be the duty of such boards of examiners to conduct all examinations called for under these regulations, to ascertain the fitness of candidates for the service of the city, in respect to character, knowledge and ability for the branch of the service into which they seek to enter, and to estimate and determine the relative excellence or standing of the persons examined, and to certify the same in such manner and form as may be prescribed. The secretary of the boards shall keep the minutes of their proceedings and all necessary records of applicants, their examinations and standings, and a complete record of all persons employed in the several departments to which these rules apply, and of all appointments, promotions, dismissals, resignations and changes of any sort therein. When not in attendance upon the examining boards, the secretary will act under the direction of the mayor.

Regulation 9.

Whenever the demands of the service may require, the examining board will notify the applicants on record, or such number thereof as can be examined conveniently at one time, to appear for examination giving place, date and hour for such examination.

Regulation 10.

Under the direction of the mayor, the boards of examiners will prepare lists of subjects of examination for admission to the several positions in Schedule B, and such list shall comprise obligatory subjects upon which each applicant must be examined; to such lists of obligatory subjects there may be added certain other subjects in which the applicant may be examined or not, at his option. The general standing of each applicant shall depend solely upon his relative proficiency in the obligatory subjects; for the purpose of determining the general average standing, certain relative weights will be given to the obligatory subjects, which weight shall be adjusted to the relative importance of the subjects.

Regulation 11.

No person whose standing on any obligatory subject is less than fifty, or whose ascertained average standing on all the obligatory subjects is less than seventy, will be entered upon the eligible list.

Regulation 12.

The names of the persons who have passed above the minimum, as set forth in the previous regulation, will be entered upon a register in the order of their excellence, and opposite each name will be entered the standing of such person in each optional subject in which he may have been examined.

Regulation 13.

1. Whenever any officer having the power of appointment to, or employment in, any position in Schedule B shall so request, the board of examiners shall certify to him the names of three eligible persons who are graded highest on the proper register, indicating such of them, if any, as have been honorably discharged from the military or naval service of the United States in the late war.

2. From the three persons whose names are so certified, the officer shall make a selection to fill the vacant place, subject, however, to the provisions of law, giving preference to persons who have been honorably discharged from the military or naval service of the United States in the late war.

3. Whenever such request shall indicate that proficiency in any of the specified optional subjects is of prime importance in the position to be filled, the board of examiners will certify the names of the three persons in the eligible list having the highest standing, not below the minimum of seventy, in such optional subject. The mayor shall have power to order a new or special examination whenever there are no persons on the eligible list sufficiently qualified in such optional subjects.

4. In the selection from the persons whose names are certified as above, the appointing or employing officer, upon his written requisition therefor, will be furnished with the application and examination papers of all the persons so certified, and in the exercise of his responsible power of selection, he may summon personally before him the certified persons, for such verbal inquiry as he may deem proper. All papers furnished upon requisition as above must be returned to the secretary of the examining board.

Regulation 14.

Whenever physical qualifications are of prime importance to the proper discharge of the duties in any position, applicants must pass an additional examination as to their physical condition and capacity, and be certified as qualified in such respects before recorded on the proper eligible list for selection for the position, or before certification by the board of examiners as qualified for such selection.

Regulation 15.

1. No person on any register shall be certified more than three times to the same officer, except upon the request of such officer, nor shall any one remain eligible more than two years on any register.

2. Upon satisfactory evidence produced to the mayor that any person whose name is on any eligible list is, by reason of character, habits or past reputation, unfit for admission to the public service, the name of such person shall be formally stricken from such eligible list.

3. No person who has entered upon any examination for a position in Schedule B or Schedule C shall be admitted within one year from the date thereof to a new examination for the same grade of position.

Regulation 16.

The positions in Schedule C may be filled by the appointing officer, in his discretion, in respect to the method of examination; the discretion of the officer in such cases shall be limited as follows:

1. He may select from the three persons graded highest as the result of an open competitive examination; or 2, he may name to the mayor three or more persons for competitive examination, and appoint the one graded highest in such examination; or 3, he may appoint or employ any person named by him who, upon a non-competitive examination, shall be duly certified by the examining board as qualified to discharge the duties of the position.

Regulation 17.

Upon the non-competitive examination into the qualifications of a person named to the mayor for a position in this schedule, the examining board will give a certificate to such person only when satisfied (1st) that he is within the limits of age prescribed by the position or employment to which he has been named; (2d) that he is properly certified as free from any physical defect or disease which is likely to interfere with the proper discharge of his duties; (3) that his character is such as to qualify him for such position or employment; and (4th) that he possesses the requisite knowledge and ability to enter on the discharge of his official duties. An officer naming to the mayor a person for examination will at the same time transmit his certificate, that after due inquiry he is satisfied that the character and habits of the person named, fit him for the public service, and will append to the certificate such formal vouchers or credentials as to character as he may desire to have considered or to put on file. In the determination of the character or habits of the nominee, the certificate thereof by the nominating officer will be considered as essential.

Regulation 18.

Whenever a vacancy in this schedule in any department, office or institution is to be filled, the officer having the authority to fill the same shall notify the mayor which of the three methods, in his discretion, under regulation 16, he selects; and if the choice be by an open competition, the examining board will proceed as for an examination under Schedule B; but if the choice be by a limited competition, or by the appointment of a person to be duly certified by the examining board as qualified, the officer aforesaid shall name in such notification the person or persons to be examined, and the mayor shall thereupon instruct the proper board of examiners, and shall notify the person or persons so named of the time, place and special regulations for the examination.

Regulation 19.

As to appointments coming under Schedule D, no examination shall be required, but all changes in the employes shall be reported to the board of examiners, in order that the record of the municipal service may be at all times complete.

Regulation 20.

Every original appointment or employment in Schedules B and C shall be for a probationary term of two months, at the end of which time, if the conduct and capacity of the person shall have been found satisfactory, the probationer shall be absolutely appointed or employed, but otherwise his employment shall cease.

Regulation 21.

Promotions will in all cases be based upon the positive merit of the person promoted and upon his superior qualifications as shown by his previous service.

Regulation 22.

No temporary appointment shall be made of any one not eligible for permanent appointment. In case where the mayor is authorized by law to make special appointments for an exigency, he may, if there shall be no eligible list from which he can select, make such appointments without examination for not exceeding two days.

Regulation 23.

Transfers of clerks and others included in Schedules B and C may be made from one office or department to another, by the mutual consent of the heads of such offices or departments; every such transfer must be reported to the mayor for record, within five days from the date thereof. No transfer will be permitted from a position enumerated in Schedule B to a position in Schedule C, or from a position enumerated in Schedule C to a position in Schedule B, by virtue of the examination which may be prescribed for the position to which they are to be transferred.

Regulation 24.

No question in any examination or proceeding shall call for the disclosure of any partisan political opinion or affiliation of any person nor shall any discrimination be made by reason thereof; and the examination shall be conducted so as to discountenance all disclosure before them of such partisan opinion or by or concerning any applicant for examination or by or concerning any person on any register awaiting appointment or employment. In the selection or appointment of persons to fill positions in Schedule B, C, no regard shall be paid to the partisan political opinions, affiliations or actions of any person so selected, nominated, appointed or promoted.

Regulation 25.

Every false statement knowingly made by any person in his application for examination, and every connivance by him at any false statement in his certificate which may accompany his application, or any willful concealment by him in any fraud to improve his standing upon his examination, shall be cause in good cause for removal or discharge of such person during his probation.

Regulation 26.

Persons who have been honorably discharged from service in the army or navy of the United States in the late war shall be preferred for appointments in the public service over other persons of equal standing, as provided under these regulations, and the person thus preferred shall not be disqualified from holding any position in the Civil Service on account of his age, or on account of any physical disability, provided such disability does not render him incompetent to perform the duties of the position applied for.

Regulation 27.

Subject only to the qualifications required to be ascertained in accordance with these regulations, the power of appointment and the responsibility therefor are in all cases in the appointing officer. The power to remove exists in all cases on the part of any officer is not impaired by any thing contained in these regulations.

Regulation 28.

No one dismissed from the service for misconduct shall be admitted to the service for appointment in any capacity in any department of the municipality within two years from the date of such dismissal.

Regulation 29.

After these regulations shall take effect no person in the Civil Service of Albany, whose position is subject to the regulations, shall be entitled to compensation unless appointed pursuant to these regulations.

Regulation 30.

These regulations shall take effect on and after the date of their adoption by the New York Civil Service Commission.

CITY OF ALBANY,
MAYOR'S OFFICE, *November 20, 1884.* }

In the exercise of the authority conferred upon the mayors of cities by chapter 410 of the Laws of the State of New York for 1884, passed May 29, 1884, the preceding regulations for the admission of persons into the Civil Service of the city of Albany, and for the conduct of persons who may receive appointments in said service are hereby prescribed and established, to take effect on the twenty-first day of November, in the year of our Lord one thousand eight hundred and eighty-four.

[L. s.]

A. BLEECKER BANKS,
Mayor.

STATE OF NEW YORK:
OFFICE OF THE CIVIL SERVICE COMMISSION, }
ALBANY, *November 21, 1884.* }

The foregoing regulations for the city of Albany, having been duly examined, are hereby approved by the New York Civil Service Commission.

JOHN JAY,
President.

[L. s.] Attest:

CLARENCE B. ANGLE,
Secretary.

TROY.

MAYOR'S OFFICE, *October 24, 1884.*

Pursuant to the statutes of this State, to regulate and improve the Civil Service thereof, I, Edmund Fitzgerald, mayor of the city of Troy, hereby prescribe the following regulations for the admission of persons into the public service of the city of Troy, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Troy, with the following exceptions required by the statutes, namely: All elective officers and the subordinates of any such officer, for whose errors or violations of duty said officer is financially responsible; and the heads of every department of the city government, and persons employed in, or who seek to enter the public service under the educational department of the city and all subordinate officers who, by virtue of their office, have personal custody of public moneys or public securities, for the safe keeping of which the head of the office is under official bonds.

Regulations 2 and 3 the same as those of Albany.

Regulation 4.

The Civil Service of the city of Troy shall be classified as follows: Schedule A; the mayor's private secretary and the mayor's messenger. Schedule B shall include all clerks, copyists, book-keepers and others rendering clerical services, and not included in Schedule A; clerks in the office of the comptroller, all police officers, station-house keepers and clerks appointed by the boards of police and excise commissioners; the superintendent of fire alarm telegraph, the chief engineer and assistant engineers of the fire department, and all firemen, engineers, clerks, drivers, and other persons appointed by the board of fire commissioners;

the superintendent of public burial grounds, the superintendent of public clocks, the sealer of weights and measures, the pound-keeper, health officer, registrar of vital statistics, clerk of the board of health, city clerk, city superintendent, city hall janitor and engineer, city physicians, superintendent of the poor, clerk of the board of charities, sanitary inspectors, superintendent of water works, and the clerks, engineers, firemen and other persons appointed by the board of water commissioners; and all persons employed in the public service of said city, or appointed by any board or officer, and not included in regulation 1, and Schedule A of this regulation.

Regulations 5 to 15, inclusive of both, the same as those of Albany.

"	16 to 19 inclusive (of Albany Regulations) omitted.
"	16 same as Albany 20.
"	17 " 21.
"	18 " 22.

Regulation 19.

Transfers of clerks and others included in Schedule B may be made from one office or department to another, by the mutual consent of the heads of such offices or departments; every such transfer must be reported to the mayor for record within five days from the date thereof.

Regulation 20 same as Albany 24 (omitting Schedules C and D.)

"	21	"	25.
"	22	"	26.
"	23	"	27.
"	24	"	28.

Regulation 25.

After these regulations shall take effect, no person in the Civil Service of the city of Troy, whose position is subject to the regulations, shall be entitled to salary or compensation; unless appointed pursuant to these regulations. And it is hereby made the duty of every board and officer of said city, with whom is vested by law the power of nominating or appointing any of the clerks, officers or public servants named in Schedule B, to notify the mayor of said city and the examining board, of any appointment or nomination which it is proposed to make, and of any vacancy connected with their departments or offices which may exist, to the end that all applicants for such positions, or to fill vacancies, may undergo the examination prescribed by these rules, before such nomination, appointment or selection shall be made.

Approved *November 18, 1884.*

LONG ISLAND CITY.

MAYOR'S OFFICE, *August 29, 1884.*

Pursuant to the statutes of this State, to regulate and improve the Civil Service thereof, I, George Petry, mayor of Long Island City, hereby prescribe the following regulations for the admission of persons into the public service of said city, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of Long Island City, with the following exceptions required by the statutes, namely:

All elective officers whose titles and the special titles of the civil officers, other than elective, excepted under the provisions of section eight of the statute, and which appear in Schedule E, annexed.

Regulations 2 and 3 the same as those of Albany.

Regulation 4.

The Civil Service of Long Island City shall be classified as follows :

Schedule A shall include all deputies of officers and commissioners duly authorized by law to act for their principals, and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve. Schedule annexed.

Schedule B shall include all clerks, copyists, recorders, stenographers, book-keepers and others rendering clerical services, and not included in Schedule A, and all policemen, firemen, messengers, orderlies, court attendants, guards and keepers in jails and prisons, and all persons employed or appointed in the public service and not specially included in Schedules A, C and D. Schedule annexed.

Schedule C shall include all persons whose duties are strictly professional and all persons who are employed in private business and occasionally render public service for a nominal compensation. Schedule annexed.

Schedule D shall include all persons employed as laborers or day workmen. Schedule annexed.

Regulations 5 to 29, inclusive of both, the same as those of Albany.

Regulation 30 omitted.

Approved *September 29, 1884.*

YONKERS.**MAYOR'S OFFICE.**

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, William G. Stahlnecker, mayor of the city of Yonkers, hereby prescribe the following regulations for the admission of persons into the public service of the city of Yonkers, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Yonkers, with the following exceptions required by the statutes : all elective officers, police commissioners, water commissioners, school trustees, clerk to the board of education, and his assistants, principals, teachers, librarians and janitors employed in the educational department of the city. Inspectors of election, poll clerks, the deputy receiver of taxes, the fire commissioners, the excise commissioners.

Regulations 2 and 3 the same as those of Albany.

Regulation 4.

The Civil Service of the city of Yonkers shall be classified as follows :

Schedule A shall include the following officers of the city : all officers nominated by the mayor, and confirmed by the common council, to-wit, the city clerk, the city treasurer, the city surveyor, the city attorney, the receiver of taxes, the health officer, the assessors, the commissioner of charities, the street commissioner, commissioners of deeds, pound keepers, scavengers, constables, fire wardens, all officers appointed by the common council, to-wit, the page, the commissioners to assess for street improvements and sewers, the wharfinger, and all officers appointed by the city judge, to-wit, the clerk of the city court, and the marshal of the city court.

Schedule B shall include all clerks, copyists, book-keepers and others rendering clerical service to the city and not included in Schedule A, and all policemen, hostlers, door-keepers and all persons employed in the police department of the city, except police surgeon, and all persons employed and appointed in the public service of the city, and not specially included in Schedules A, C and D.

Schedule C shall include all persons, whose duties are strictly professional, to-

wit, the inspector of boilers and examiners of engineers in the city of Yonkers the engineers of the water department, and assistants, the inspector of water meters and the police surgeon.

Schedule D shall include all persons employed as laborers or day-workmen.
Regulation 5 same as Albany 8.
Regulation 6 same as Albany 5.
Regulations 7 and 8 same as Albany 6.

Regulation 9.

Registers of all applicants shall be kept by the secretary of the examining board. When the applicants on a register are in excess of such number as can be examined conveniently on the same day, the applicants will be notified to appear for examination in their order on the register.

Regulation 10.

EXAMINATIONS.

Whenever the demands of the service may require, the examining board will notify the applicants of record, or such number thereof as can be examined conveniently at one time, to appear for examination giving place, date and hour for such examination.

The general examination for admission to positions in Schedule B will be on the following subjects:

OBLIGATORY.

- 1. Handwriting, as shown by copying from manuscript.
- 2. Writing from dictation.
- 3. English spelling, as shown in writing from dictation.
- 4. Arithmetic, viz., addition, subtraction, multiplication, and division—all applicable to whole numbers and fractions.
- 5. Abstracting or digesting documents or letters into summaries.
- 6. Questions relating to Yonkers — concerning the local government, the location of streets, etc.

OPTIONAL.

- 7. Arithmetic applied, viz., practical problems in proportion, percentage, interest, discount and average.
- 8. Letter writing on subjects connected with Yonkers' affairs, grammatical correctness, clearness and brevity of expression, will be considered.
- 9. Book-keeping.
- 10. Special qualifications for employment in any specified department of city government.

Regulation 11.

Every applicant must be examined in the six obligatory subjects, and will be examined further in such of the optional subjects as he may designate.

Regulation 12.

The relative weight given to the several obligatory subjects in making up the average standings, will be as follows:

1. Handwriting	3
2. Writing from dictation.....	1
3. English spelling.....	2
4. Arithmetic	2
5. Abstracting.....	1
6. Yonkers' data.....	1
<hr/>	
Total of weights.....	10

Regulation 13.

Each subject will be marked upon a scale of 100, which number represents the maximum possible attainment.

Regulation 14.

The process of ascertaining the absolute standing of each competitor will be as follows:

SCHEDULE B, EXAMINATION No. 26.

YONKERS' MUNICIPAL SERVICE, }
July 30, 1884. }

RESULT OF EXAMINATION OF ADAM ROBERTS.

Subjects.	Standing on subject.	Weight given on subject.	Product of standing and weight.
1. Handwriting.....	93	3	279
2. Writing from dictation....	90	1	90
3. English spelling.....	67	2	136
4. Arithmetic	72	2	144
5. Abstracting.....	70	1	70
6. Yonkers' data... ..	79	1	79
Total product.....			798

Divide product by sum of weights, 10, or general average standing, 79.8.
8. Letter writing, 85.

Regulation 15.

The standing on each of the optional subjects, in which any competitor is examined will be marked on a scale of 100, and will be recorded on the preceding form as there shown.

The aggregate results of each examination will be entered in form as follows upon a

REGISTER OF ELIGIBLE CANDIDATES.

Relative general standing.	Names of competitors.	General or obligatory subjects.	Absolute standing on optional subjects.			
		1 to 6.	7	8	9	10.
1.	Charles O'Malley.....	89	80	70	..	79
2.	Peter Davis.....	87	..	84	78	..
3.	Carl Schmidt.....	86	..	..	..	87
4.	David Thompson.....	83	87	88	71	76
5.	James Brown.....	83	89	..	..	85
6.	Terence Murphy.....	82	82	90	87	74
7.	Edward Green.....	81	94	..	85	81
8.	Richard Roe.....	80	..	..	..	..
9.	Max Adler.....	80	78	..	..	88
10.	Adam Roberts.....	79.8	..	85	..	..

Regulation 16.

No person whose standing on any obligatory subject is less than fifty, and whose ascertained average standing on all the obligatory subjects is less than seventy, will be entered on the eligible list.

Regulations 17 same as Albany 13
" 18 " 14.

Regulation 19.

Priority of date in examination will give no advantage; the names of three eligible persons standing highest will be certified for selection without regard to dates when examined.

No person on the eligible list shall be certified for selection more than three times to the same appointing officer, except at the latter's request, nor shall the

name of any person remain on the eligible list more than one year from the date of the original examination.

Regulation 20.

Appointments to positions in Schedule C shall be made by the head of the office or department subject to a qualifying examination only, or in the discretion of such official, they may be offered for open competition, or for limited competition of such persons as may be named by the head of the department, but no person shall receive an appointment to any position in this schedule, except upon the certificate of the examining board that such person has been found to be duly qualified. All examinations under this rule shall be conducted under the auspices of the examining board, and shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of that service for which they are named, or into which they seek to be appointed. For such purpose the examining board shall be satisfied, and shall so certify that the person named or applying is:

FIRST — Within the limits of age prescribed for the situation or employment for which named or applying.

SECOND — That he is free from any physical defect or disease likely to interfere with the proper discharge of his duties.

THIRD — That his character is such as to qualify him for such situation or employment.

FOURTH — That he possesses the requisite knowledge and ability to enter upon the discharge of the duties of such situation or employment.

Regulation 21 same as Albany 19.

" 22 " 20.

Regulation 23.

TEMPORARY APPOINTMENTS.

No temporary appointments shall be made of any one not eligible for permanent appointment.

Regulation 24.

NEW POSITIONS.

All new positions created at any time by the needs of the service in any department must be filled by examination, either competitive or qualifying, as the mayor shall determine.

Regulation 25.

Promotions from the lower grades to the higher shall be on the basis of merit and competition.

Regulation 26 same as Albany 25.

" 27 " 28.

Regulation 28.

No recommendation or question under the authority of these regulations shall relate to the political opinions or affiliations of any person whatever; neither shall political opinions be considered by the appointing officer, in determining his selection among candidates certified for appointment.

Regulation 29 same as Albany 24.

Regulations 7 to 12, inclusive of both, and 15, 16, 17, 18, 21, 22, 23, 26, 27, 29 and 30 of Albany Regulations omitted.

Approved October 10, 1884.

OGDENSBURG.

MAYOR'S OFFICE, *August 4, 1884.*

In the exercise of the authority conferred on mayors in all the cities of this State by the eighth section of chapter 354 of the Laws of the State of New York, passed May 4, 1883, as amended by chapter 357, passed May 24, 1884, and chapter 410, passed May 29, 1884, I, William L. Proctor, mayor of the city of Ogdensburg, hereby prescribe the following regulations for the admission of persons into the Civil Service of the city of Ogdensburg.

Regulation 1.

These regulations shall not apply to officers elected by the people nor to the following officers, viz., the chief of police, the assessor, the chief engineer of the fire department and his assistants, the treasurer, the city clerk, and the street, park or water commissioners.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Ogdensburg shall be classified as follows:

Schedule A shall include all deputies of officers and commissioners duly authorized by law to act for their principals, and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve. (Have none.)

Schedule B shall include all copyists, stenographers, book-keepers, and others rendering clerical services and not included in Schedule A, and all messengers, orderlies, court attendants, policemen, guards and keepers in jails and prisons, and all persons employed or appointed in the public service and not specially included in Schedules A, C and D.

Schedule C shall include all persons whose duties are strictly professional and all persons who are employed in private business and occasionally render public service for a nominal compensation.

Schedule D shall include all persons employed as laborers or day workmen.

Regulations 5 to 29, inclusive of both, are the same as those of Albany.

Regulation 30.

The right is reserved by the mayor to alter or modify these regulations as in his judgment the needs of the service may require, such changes or modifications to take effect after one week's publication thereof in one newspaper published in said city.

Approved *September 25, 1884.*

SYRACUSE.

MAYOR'S OFFICE.

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, Thomas Ryan, mayor of the city of Syracuse, hereby prescribe the following regulations for the admission of persons into the public service of the city of Syracuse, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Syracuse, with the following exceptions required by the statutes, namely:

All elective officers; all positions in the educational department of the city.

All positions not purely clerical filled by appointment by the common council, viz., city clerk, city treasurer and tax receiver, city attorney, city surveyor and engineer, superintendent of the streets, city physician, janitor, lamp repairer, weigher of hay, members of the board of health.

Regulations 2 and 3 the same as those of Albany.

Regulation 4.

The Civil Service of the city of Syracuse shall be classified as follows:

Schedule B shall include the clerk of the police court, the clerk of the board of fire commissioners, the chief of police, the captain of the night watch, the chief engineer of the fire department, all firemen and policemen, and all persons employed or appointed in the public service and not specially included in Schedule D.

Schedule D shall include all persons employed as laborers or day workmen.

Regulation 5 same as Albany 6.

"	6	"	"	7.
"	7	"	"	8.
"	8	"	"	9.
"	9	"	"	10.
"	10	"	"	11.
"	11	"	"	12.
"	12	"	"	13.
"	13	"	"	14.
"	14	"	"	15.
"	15	"	"	19.

Regulations 16, 17 and 18 of Albany omitted.

Regulation 16 same as Albany 20.

"	17	"	"	21.
"	18	"	"	22.
"	19	"	"	23 (omitting last sentence).
"	20	"	"	24.
"	21	"	"	25.
"	22	"	"	26.
"	23	"	"	27.
"	24	"	"	28.
"	25	"	"	29.

Albany regulation 30 omitted.

Approved *December 1, 1884.*

AUBURN.**MAYOR'S OFFICE.**

Pursuant to the statutes of this State, I, Cyrenus Wheeler, Jr., mayor of the city of Auburn, hereby prescribe the following regulations for the admission of persons into the public service of the city of Auburn, to take effect from the date of their approval by the "New York Civil Service Commission."

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Auburn, with the following exceptions required by the statutes; namely, all elective officers, and persons employed in, or who seek to enter the public service under the educational department of the city, and the following officers appointed by ballot by the common council as provided by the city charter; namely, the city attorney, the street superintendent, the city surveyor, the keeper of the city hall, one or more sealers of weights and measures, one or more scavengers, the city sexton, ten commissioners of deeds, three fire commissioners, the commissioners of Soules' cemetery, six members of the board of health, also three commissioners of excise, appointed by the mayor under the statute law.

Regulations 2 and 3 same as those of Albany.

Regulation 4. In the public service, and

The Civil Service of the city of Auburn, shall be class:
 A shall include all deputies of commissioners, duly appointed and strictly professional, their principals; and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve; namely, the clerk of the commissioners of excise, the clerk of the board of fire commissioners, the superintendent of charities, also physicians to the board of health, the charities and police, the sexton of Soules' cemetery, and the chief of police.

Schedule B shall include all clerks, copyists, recorders, stenographers, bookkeepers, and others rendering clerical service and not included in Schedule A, and all policemen and persons employed or appointed to the public service, and not specially included in Schedules A and D.

Schedules D shall include all persons employed as laborers or day workmen.

Regulations 5 to 15 (inclusive of both) same as those of Albany.

Albany regulations 16, 17, 18, 23, 27 and 30, omitted.

Regulation 16 same as Albany 19.

"	17	"	"	20.
"	18	"	"	21.
"	19	"	"	22.
"	20	"	"	24.
"	21	"	"	25.
"	22	"	"	26.
"	23	"	"	28.
"	24	"	"	29.

Albany regulation 30 omitted.

Approved *October 3, 1884.*

ROCHESTER.

MAYOR'S OFFICE, August 20, 1884.

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, Cornelius R. Parsons, mayor of the city of Rochester, hereby prescribe the following regulations for the admission of persons into the public service of the city of Rochester, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Rochester, with the following exceptions required by the statutes, namely: All elective officers and the subordinates of the city treasurer and persons employed by, or who seek to enter the public service under the board of education.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Rochester shall, except as above stated, be classified as follows: Schedule B (part 1), all elective officers of the police and fire departments.

Schedule B (part 2), all other subordinate officers, clerks and assistants.

Schedule D shall include all persons employed as laborers or day workmen.

Albany regulations 5, 16, 17, 18, 23 and 30 omitted.

Regulation 5 same as Albany 6.

"	6	"	"	7.
"	7	"	"	8.
"	8	"	"	9.

Regulation 19 same as Albany 10.

" 20 " " 11.

" 21 " " 12.

" 12 " " 13.

" 13 " " 14.

" 14 " " 15.

" 15 " " 19 (except latter part, but all changes in the employees, etc.).

" 16 " " 20.

" 17 " " 21.

" 18 " " 22.

" 19 " " 24.

" 20 " " 25.

" 21 " " 26.

" 22 " " 27.

" 23 " " 28.

" 24 " " 29.

Regulation 25.

The right is reserved by the mayor to alter or modify these regulations in his judgment, the needs of the service may require, due notice thereof given to the New York State Board of Civil Service Commissioners.

Approved September 25, 1884.

BINGHAMTON.

MAYOR'S

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, George A. Thayer, mayor of the city of Binghamton, hereby adopt the following regulations for the admission of persons into the public service of the city of Binghamton, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Binghamton, with the following exceptions required by the statutes,

All elective officers and heads of departments and positions in the executive department, and any subordinate officer who, by virtue of his office, has custody of public moneys or securities, for the safe-keeping of which the officer is under official bonds, and the following officers appointed by the common council, as provided by the city charter, namely: The city clerk, the superintendent of streets, the treasurer and tax receiver, recorder, city veyor, fire marshals, commissioners of deeds, city sexton, six members of board of health, and four police commissioners, appointed by the mayor under the act to establish a police force for the city of Binghamton; also, the commissioners of excise, appointed by the mayor under the statute law.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Binghamton shall be classified as follows: Schedule A shall include: city clerk, health officer, chief of police, engineer of fire department, first assistant engineer of fire department, second assistant engineer of fire department, registrar of vital statistics, weights and measures, clerk of excise board, clerk of police board.

Schedule B shall include assistant chief of police, policemen, clerks, recorders, stenographers, book-keepers and others rendering clerical services.

all messengers, and all persons employed or appointed in the public service, and not specially included in Schedule C.

Schedule C shall include all persons whose duties are strictly professional, and all persons who are employed in private business, and occasionally render public service for a nominal compensation.

Regulations 5 to 18 (inclusive of both) same as those of Albany.

Albany regulation 19 omitted.

Regulation 19 same as Albany 20.

"	20	"	"	21.
"	21	"	"	22.
"	22	"	"	23.
"	23	"	"	24.
"	24	"	"	25.
"	25	"	"	26.
"	26	"	"	27.
"	27	"	"	28.
"	28	"	"	29.

Albany regulation 30 omitted.

Approved *December 15, 1884.*

UTICA.

MAYOR'S OFFICE, *October 10, 1884.*

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, James S. Sherman, mayor of the city of Utica, hereby prescribe the following regulations for the admission of persons into the public service of the city of Utica, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Utica, with the following exceptions required by the statutes, namely: All elective officers and heads of departments, positions in the educational department, and any subordinate officer who, by virtue of his office, has personal custody of public moneys or securities, for the safe-keeping of which the head of an office is under official bonds; city engineer and surveyor, street commissioner, corporation counsel, clerk of school board, members of board of health, excise commissioners, town auditors, police and fire commissioners.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Utica shall be classified as follows:

Schedule A shall include the city clerk, and the health officer.

Schedule B shall include the charity clerk, keeper of city hospital, two sanitary inspectors, deputy clerk of city, chief of police, assistant chief, policemen, chief of fire department, assistant chief of fire department, firemen, engineers, stokers, drivers, pipemen, clerks, recorders, stenographers, book-keepers and others rendering clerical services, and all messengers, orderlies, court attendants, guards and keepers in jails and prisons, and all persons employed or appointed in the public service and not specially included in Schedule C.

Schedule C shall include all persons whose duties are strictly professional, and all persons who are employed in private business and occasionally render public service for a nominal compensation, viz.: clerk of excise board, clerk of board of police and fire commissioners, keeper of city clock, sealer of weights and measures.

Regulations 5 to 18 (inclusive of both) same as those of Albany.

Regulation 19 same as Albany 20.

"	20	"	"	21.
"	21	"	"	22.
"	22	"	"	23.
"	23	"	"	24.
"	24	"	"	25.
"	25	"	"	26.
"	26	"	"	27.
"	27	"	"	28.
"	28	"	"	29.

Albany regulation 30 omitted.

Approved *October 17, 1884.*

COHOES.

MAYOR'S OFFICE.

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, Alfred LeRoy, mayor of the city of Cohoes, hereby prescribe the following regulations for the admission of persons into the public service of the city of Cohoes, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Cohoes, with the following exceptions required by the statutes, namely :

Fire commissioners, members of the board of health, water commissioners, commissioners of excise, president of the board of education, clerk of the board of education, superintendent of public schools, teachers in the public schools, city chamberlain.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Cohoes shall be classified as follows :

Schedule A shall include all deputies of officers and commissioners duly authorized by law to act for their principals, and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve.

(There are at present no positions included in Schedule A.)

Schedule B shall include all clerks, copyists, recorders, stenographers, book-keepers and others rendering clerical services and not included in Schedule A, and all policemen, firemen, messengers, orderlies, court attendants, guards and keepers in jails and prisons, and all persons employed or appointed in the public service and not specially included in Schedules A, C and D.

Schedule C shall include all persons whose duties are strictly professional and all persons who are employed in private business and occasionally render public service for a nominal compensation, namely :

City attorney, police surgeon, health officer.

Schedule D shall include all persons employed as laborers or day workmen.

Albany regulation 30 omitted.

Approved *October 3, 1884.*

POUGHKEEPSIE.

MAYOR'S OFFICE.

Pursuant to the statutes of this State, to regulate and improve the Civil Service thereof, I, Ezra White, mayor of the city of Poughkeepsie, hereby prescribe the following regulations for the admission of persons into the public service of the city of Poughkeepsie, to take effect from the date of their approval by the New York Civil Service Commission.

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Poughkeepsie, with the following exceptions, required by the statutes, namely:

FIRST — Officers elected by the people, viz.: The mayor; aldermen; justices of the peace; recorder; school commissioners; alms house commissioners and constables.

SECOND — The head or heads of any department of the city government, viz.:

1. Officers appointed by the mayor, viz.: Assessors; city attorney; city treasurer; city chamberlain; city sealer; superintendent of streets; police commissioners; excise commissioners and water commissioners.

2. Officers elected by the common council, viz.: Members of the board of health.

3. Persons employed in, or who seek to enter the educational departments of the city.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Poughkeepsie shall be classified as follows:

SCHEDULE A.

1. All deputies of officers and commissioners, duly authorized by law to act for their principals, and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve.

2. Clerks of boards and commissions who are by law required to be members of boards and commissions on which they serve, viz.: Secretary of the police commissioners; secretary of the board of health.

3. Subordinate officers who, by virtue of their office, have personal custody of public moneys, for the safe keeping of which the head of the office is under a special bond.

SCHEDULE B.

FIRST — Chamberlain's office: Clerk.

SECOND — Fire department: Assistant engineers; engineers of steamers; firemen of steamers.

THIRD — Alms house department: Superintendent of the alms house; assistant superintendent of the alms house.

FOURTH — Police department: Sergeant; roundsmen; patrolmen; police constables.

FIFTH — Water department: Secretary; clerks; chief engineer; assistant engineers; firemen; coal passers; foremen; caulkers; tappers; watchmen; inspectors.

SIXTH — The janitor of the city building; bell ringers; commissioners of deeds.

(Schedule B includes all clerks, copyists, book-keepers and others rendering clerical services, and not included in Schedule A, and all policemen, firemen, messengers, court attendants, and all persons employed or appointed in the public service and not specially included in Schedules A, C and D.)

SCHEDULE C.

1. Chief of police; chief engineer of fire department; superintendent of the water works; surgeon of the police department; physician to alms house.

2. Schedule C includes all persons whose duties are strictly professional, and all persons who are employed in private business and occasionally render public service for a nominal compensation.

SCHEDULE D.

FIRST — Street department: Laborers; cartmen; teamsters.

SECOND — Water department: General laborers; day workmen.

THIRD — Schedule D shall include all persons employed as laborers or day workmen.

Regulations 5 to 30 (inclusive of both) same as Albany regulations.

Approved *December 29, 1884.*

KINGSTON.

MAYOR'S OFFICE, *January 29, 1885.*

Pursuant to the statutes of this State to regulate and improve the Civil Service thereof, I, Charles Bray, mayor of the city of Kingston, hereby prescribe the following regulations for the admission of persons into the public service of the city of Kingston, to take effect from the date of their approval by the New York Civil Service Commission

Regulation 1.

These regulations shall apply to all positions in the public service of the city of Kingston, with the following exceptions required by the statutes, namely:

All elective officers and the commissioners of the alms house, the excise commissioners, and the health commissioners.

Regulations 2 and 3 same as those of Albany.

Regulation 4.

The Civil Service of the city of Kingston shall be classified as follows:

Schedule A shall include all deputies of officers and commissioners duly authorized by law to act for their principals, and all persons whose official relations are necessarily strictly confidential to the head of the office in which they serve. The following positions are in Schedule A: The city clerk, the city treasurer, the corporation counsel, the secretary of the board of health.

Schedule B shall include all copyists, recorders, stenographers, book-keepers and others rendering clerical services and not included in Schedule A, and all policemen, firemen, messengers, orderlies, court attendants, guards and keepers in prisons, and all persons employed or appointed in the public service and not specially included in Schedules A, C and D, and shall include the following named officers: City engineer, clerk board of excise, and all engineers of fire engines.

Schedule C shall include all persons whose duties are strictly professional, and all persons who are employed in private business and occasionally render public service for a nominal compensation. Superintendent of streets, chief engineer of fire department, and his assistants, city sealer of weights and measures, and superintendent of water works.

Schedule D shall include all persons employed as laborers or day workmen.

Regulations 5 to 29, inclusive of both, same as those of Albany.

Regulation 30 of Albany regulations omitted.

Approved *January 29, 1885.*

APPENDIX G.

CITY REPORTS.

Hon. FRANKLIN EDSON, *Mayor of the city of New York*:

In compliance with your request, we submit the following report in response to the communication of the State Civil Service Commission dated November 13, 1884.

On the 15th day of December, 1883, regulations for the admission of persons into the Civil Service of the city of New York were prescribed by the mayor to take effect January 1, 1884. The regulations applied to all persons in the service of the city with the exception of elective officers and members of the police, health, fire, educational and law departments and all officers who have the custody of public moneys for which any head of an office has given bonds and is responsible thereunder, and all officers appointed by the mayor and confirmed by the board of aldermen.

The persons in the service of the city subject to these regulations were divided into four schedules.

Schedule A included deputies duly authorized to act for their principals, persons actually occupying a strictly confidential position and stenographers.

Schedule B included persons rendering clerical service.

Schedule C included all persons, not laborers or day workmen, not included in the previous schedules.

Schedule D included persons employed as laborers or day workmen.

No examination was required for those included in Schedule A. The examination for admission to Schedule B, and for nurses, attendants and orderlies was competitive. The examination for admission to other positions in Schedule C was a pass examination and no examination was provided for appointments coming within Schedule D.

To conduct the examinations under these schedules three boards of examiners were created; one for positions in Schedule B, one for all applicants for positions in Schedule C, except those named for positions as nurses, attendants and orderlies in the city hospitals and asylums, and one for the last mentioned class of positions. Appointments to all positions under Schedules B and C were to be provisional only, and such provisional service was required to continue not longer than six months. If during that period the conduct and character of the appointee were found satisfactory it was provided that he should receive an absolute appointment, but otherwise his employment should cease.

These regulations continued in force until the 29th day of August, 1884. Making suitable allowances for the difficulties always experienced in the introduction of a new system, the character of the examinations held pursuant to these rules was practical and adapted to ascertain the fitness of the applicants for the places which they sought. The effect of these examinations, so far as relates to positions in Schedule B was to throw open to general competition all clerkships in the different departments included within these rules, and to provide an efficient way of determining the qualifications of applicants. So far as the class of positions included in Schedule C is concerned, the effect of examinations was to exclude a number of incompetent applicants. Their tendency was to raise the tone of the service by affording a guarantee both to the appointing power, and to applicants for positions, that no appointments would be made without preliminary inquiry into the fitness of the person for the place he sought.

These rules remained in force until the 29th of August, 1884. On the 29th of July, 1884, in pursuance of the requirements of the amended Civil Service act, the mayor caused to be arranged in classes the several clerks and persons employed in the public service of the city, including in such classes as far as possible, all subordinate clerks and officers in the municipal service to whom his power under the act extended. On the 22d of August, 1884, the mayor prescribed sixty-six regulations for the admission of persons into the Civil Service of the city, and for the conduct of persons who should receive appointments in the service, to take effect on the 29th of August, 1884. These regulations were approved by the New York Civil Service Commission on the 23d of August. Under them the service of the city was divided into seven schedules. These schedules are as follows:

Schedule A includes all deputies of all officers and commissioners duly authorized to act for their principals, and all persons necessarily occupying a strictly confidential position.

Schedule B includes clerks, copyists, recorders, book-keepers and others rendering clerical services.

Schedule C includes policemen, both in the police department and department of parks, and the uniformed force in the fire department.

Schedule D includes all persons for whose duty special expert knowledge is required not included in Schedule E.

Schedule E includes physicians, chemists, nurses, orderlies and attendants in the city hospitals and asylums.

Schedule F includes all persons not included in the foregoing schedules and not laborers or day workmen.

Schedule G includes laborers.

For the purpose of ascertaining the qualifications of persons seeking positions in the city service, three boards of examiners are provided, one for positions in Schedules B and C; one for positions in Schedule D, and one for positions in Schedules E and F. Each of these boards of examiners is composed of three persons. In addition to them, an advisory board consisting of three persons has been appointed to have the general supervision of the working of the new system and to aid the mayor in its administration. The great majority of places under these schedules as to which examinations take place at all are thrown open to public competition. It has not been found practicable as yet to subject to such competition all places requiring for their proper discharge special experience, such as those of the physicians and surgeons in the hospitals and asylums of the city.

So far as the examinations under Schedule B are concerned, the examinations do not differ materially from those held under the previous rules, nor from those held for clerical positions in the service of the United States. The examinations for places under all the schedules except C are required to be in writing. The name of the applicant is not given to the examining board, but he is known during the examination by a number. No questions are allowed, the answers to which would indicate his political affiliations. The boards of examiners are empowered to employ experts to aid them in determining the qualifications of candidates.

The general scheme of examination for policemen and firemen is this: In the first place, a schedule is provided, which must be filled by the applicant, containing a detailed statement as to his health, his occupation and his experience. Having made this preliminary statement, he is to be examined by an official surgeon. A schedule is provided which the surgeon must fill up in answer to questions on the various points in the applicant's physical condition as to which inquiry is desirable. The general object of the surgical examination is to sift out all the applicants who by reason of any physical defect would probably fail to endure the severe strain to which firemen and policemen are sometimes exposed. After the examination by the surgeon, the applicant is examined in reference to his physical aptness and dexterity. This portion of the examination is new.

Experience has seemed to indicate that a purely medical examination, while it tends to reject all persons of defective physical organization, fails to indicate those who have distinct physical excellence and it seems clear that one is as important as the other. A policeman might, for example, be in perfect health, yet if the condition of his frame were such that he could not run, that he could not shoot with accuracy, that he could not hold his own in a scuffle with a burglar, he would be an undesirable member of the force. He is also required to submit references from responsible persons as to his habits and reputation, and in the case of a policeman the captain of the precinct in which the applicant resides is required to make personal inquiry of them and to report the results of such inquiry. In the case of firemen this duty of inquiry is devolved upon the chiefs of battalion. All these statements are laid before the examining board for their consideration. The applicant is then examined as to his experience in any position tending to qualify him for the branch of the service which he seeks to enter, and then as to what perhaps might be called his intellectual qualifications. He must be able to read, to write, to make a clear statement of the substance of matter orally communicated, to answer intelligently as to the requirements of the rules of the police of the fire department relating to the duties of the position applied for; and he is further to be questioned, if he seeks appointment as policeman, with reference to the location of streets, public buildings and other subjects respecting which strangers in the city naturally inquire. In the case of firemen these questions are directed to the location of streets and the location and construction of buildings with special reference to precautions against fire.

Having all these data before them the examining board is now required to make up a statement of results. In apportioning the weight to be given to the different subjects respecting which inquiry has been made they allot, on a scale of ten, to physical qualifications, four; to general character, two; to experience, one; and to the other subjects, three. Under the head of Rules and Regulations, it is required that the examiners, having given the applicants opportunity to study the rules of the department, should state to them cases, preferably actual cases which have occurred, and ask the applicant what he would do under the circumstances indicated, and what his powers would be should he be appointed policeman. The names of applicants are entered on a list in the order of fitness as shown by the results of all these inquiries.

The number of places included in the operation of these rules is so great and the necessary difficulties incident to the adoption of a new system on so large a scale so considerable, that there has been some delay in the examinations and some have not been as complete as in future it is expected they will be. The character of positions in the service of the city is so diverse, that the framing of proper questions for the purpose of testing the qualifications of the applicants for each class of positions is not an easy task. But it is to be remembered that the same difficulties existed under the previous system. In all cases it was assumed that some inquiry was made in regard to the qualifications of applicants for any particular place. If no such inquiries were made it certainly was a violation of duty. If made they were presumptively intended to be something in the nature of an examination, adapted to ascertain the qualifications of the applicant. The difference between the two systems is that in one case the inquiries are conducted by a board specially assigned for the purpose and in pursuance of a prescribed system. In the other case they were conducted without system and very often by persons feeling no special responsibility in regard to the result.

The fundamental rule in reference to examinations is that the board of examiners shall ascertain the fitness of candidates with regard to character, knowledge and ability for the branch of the service which they seek to enter and the relative excellence and standing of the persons examined by examination on such matters as will fairly test the relative capacity and fitness of the persons examined for the particular duties with which they seek to be charged.

In reference to the various schedules, different subjects are pointed out to which inquiry should especially be directed, but the rule just quoted is the con-

trolling rule and the one that in all cases should guide the examiner. It is provided that no candidate shall be placed upon the eligible list unless his standing is seventy on a maximum of one hundred. From the highest on the list in some cases five and in some cases three persons are sent to the appointing power and from these persons so sent his selection is made. This selection is, however, subject to the test of probation provided for in these rules as under the previous rules.

In reference to promotions it is provided that they shall be on the basis of merit and competition; that persons suitably qualified already in the service shall have the preference, but in case no person is found in the service who in the opinion of the appointing power is qualified to fill the superior place, it is to be thrown open to competition from among those not in the service.

It is too soon as yet to speak with precision of the practical results of the examinations under these revised regulations. In many cases very few applicants have presented themselves, and the range of selections has been on this account too limited. The old system of appointment solely in the discretion of the appointing power has prevailed so long that it is not surprising that the character and effect of the new rules should as yet be imperfectly understood. Doubtless, too, as the examining boards acquire experience, their range of questions will be more exactly adapted to test the qualifications of applicants.

There is no magic in competitive examinations. They eliminate the elements of favoritism and partisanship, from appointments to office, as far as possible. But as to the determination of the comparative fitness of the applicant, everything depends upon the skill and judgment of the examining board. They may be and are aided by the services of experts. But it is desirable that at least one member of each board which has to determine the fitness of all persons for whose duty special expert knowledge is required, should be himself especially familiar with the subject matter of the examination, or qualified for his duty by practical experience.

In conclusion it may be said that the inevitable effect of the old system was to concentrate power in the hands of political leaders and to make the whole official corps a band of mercenaries who supported the fortunes and followed the banners of political leaders. Nothing could be more opposed to the whole spirit and genius of American institutions. Our government in theory is based on an equality of privileges and rights. No legislation can give equality of natural endowments, and consequently none can give an equality of acquisitions or possessions. But what this government first of all governments, undertook to do, was to give to every citizen an equal opportunity before the law. Nothing can be more hostile to this than the idea that no man can obtain an appointment who has not some political backing, who has not some influential friend, who either from motives of friendship or for reasons of interest is disposed to press his appointment upon the appointing power. And nothing can be more conducive to an unfaithful and inefficient discharge of duty than the feeling on the part of an official that his continuance in office must depend not upon his faithful service but upon his fealty to the men who appointed him or who keep him where he is.

The system of examination embodied in the Municipal Civil Service Regulations has at least the merit of giving to every citizen of good character, so far as practicable, an opportunity to compete on equal terms for employment in the service of the city of New York.

Annexed are schedules containing answers to the specific questions submitted by the State commission as far as it has been practicable to prepare them, and covering the period from the first of January to the first of December 1884. The answer to question No. 2 is incomplete, because many of the persons employed who are subject to examination under the regulations are paid by the day and are not employed continuously, and it would therefore be impracticable to prepare an exact answer to the question as to their annual compensation, without an analysis of all the pay rolls in the comptroller's office.

As to the fourth question, respecting age and previous education of applicants, it is impossible to give a complete answer. Under the regulations which went

into effect on the first of January, it was not required that applicants should state their age, and in many instances it was not required that they should state their previous education. There is consequently no complete information available on these two points. As far as possible such information is given in the annexed schedules.

The analysis of the positions included within the scope of the Civil Service rules is prepared from official reports made by the several departments of the Civil Service Commission, and transmitted to the Legislature January 31, 1884.

Some changes have taken place since that time, but their number is inconsiderable.

The positions under the Aqueduct Commission are not included in the annexed schedules, because the regulations relating to the work of that commission are in progress of revision, and the answers respecting such positions cannot therefore be accurately given.

All of which is respectfully submitted.

Dated at New York, *December 8, 1884.*

EVERETT P. WHEELER,
EDWIN L. GODKIN,
E. R. ROBINSON.

Approved, FRANKLIN EDSON, *Mayor, December 10, 1884.*

SCHEDULE

CONTAINING ANSWERS TO SPECIFIC QUESTIONS OF CIVIL SERVICE COMMISSION.

1. Number of positions (exclusive of laborers exempt from examination) under the regulations.....	118
2. Number of positions subject to examination under the regulations, with the aggregate annual amount of compensation of all such positions	5,540
The amount of compensation is not given for the reasons stated in the foregoing report.	
3. Number of such positions subject when vacant to be filled by selection from those who have passed in competitive examinations, giving separately the number of positions as clerks, policemen, firemen, etc., so far as may be conveniently classified.	
Fire department.....	819
Police department.....	2,741
Department of public works.....	368
Finance department.....	114
Counsel to the corporation.....	21
Department of taxes and assessments.....	43
Health department.....	121
Department of docks.....	162
Office of the city record.....	8
Department of street cleaning.....	76
Department of public parks.....	156
Department of public charities and correction.....	836
Mayor's office.....	16
Municipal service boards.....	3
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	5,484

4. Number of persons who have entered the competitive examinations, giving their average age and their education, viz.: whether common school, academic or collegiate, i. e., the numbers of each.

Common school education	135
Academic education.....	28
Collegiate education.....	34
Not given.....	414
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	758
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Their age cannot be given since in their application papers they merely state that they have reached the age of eighteen years.

- 5. Number of those examined who have passed the minimum..... 600
- 6. Number of those selected for employment, giving their average age and their education as above.

For positions other than nurses, orderlies and attendants.

Common school education.....	8
Academic education....	1
Collegiate education.....	4
Not given.....	1
	<hr/>
	14
	<hr/>

Nurses, orderlies, and attendants not given; their age cannot be given for the reason above stated.

	205
7. Number of those discharged during or at end of probationary period.	None
8. Number of positions to be filled when vacant by non-competitive examination	54
9. Number of persons subjected to non-competitive examination, and number passed as qualified and subsequently employed:	
Passed	850
Rejected.....	56
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	406
	<hr/>

Appointed	182
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- 10. Number of those discharged during or at end of probationary period. None
- 11. Names of the examiners giving the Schedule.
SCHEDULES B AND C. — A. R. Macdonough, J. Seaver Page, Wyllys Hodges.
SCHEDULE D. — Arthur H. Dundon, Dan. B. Smith, James Moir.
SCHEDULES E AND F. — F. Herring Burchard, M. D., F. Tilden Brown, M. D., Thomas H. Manley, M. D.

FIRST REPORT.

BROOKLYN, *December 26, 1884.*

To the Hon. SETH LOW, *Mayor:*

SIR—The Civil Service Commission of Brooklyn beg leave to submit to you its first annual report. This report will include the period from the 15th of December, 1883, when the mayor prescribed the first Civil Service regulations. The present commission was not, indeed, appointed, and the present Civil Service regulations were not adopted until September, 1884; but for the sake of completeness in our historical record we deem it better that our report should commence with the definite inauguration of the reform in Brooklyn.

The year has in this matter been one of experiment, of trial and of growth. We are not now prepared to suggest any further changes in the Civil Service regulations, or in the methods of examination. We are, however, by no means certain that we have reached the best methods of regulating admission to the Civil Service of the city. We are sure, indeed, that larger practice in the actual administration of the new system will lead not only to more perfect detail, but doubtless to material changes in methods. We readily admit that faults and errors may be detected in the Civil Service work so far done in Brooklyn; but we believe that the faults and errors have been no greater than those necessarily incident to any radical change in administration. Whatever the imperfections in the application of the new methods, they have been, we are convinced more and more by our experience and observation, a great and unmistakable improvement upon the previous methods of selecting the employes of the city. The pressure for appointments upon officers who are busily engaged in the performance of the work of their departments has very largely disappeared. The humiliating sense of personal favor, and the demoralizing weight of political obligation, which have hitherto attended appointments to mere business places in the city government, have at least begun to abate. There is being gradually established an invaluable impression of free and open fairness. And the persons selected under the Civil Service examinations have been, we believe, on the whole, though possibly with some exceptions, of an intelligence and efficiency superior to the average prevailing since the service or the city became as numerous and as varied as it now is.

Our experience and observation bring us also larger and larger assurance that an open free competition is the essential condition of the reform of Civil Service; that where such competition is not practicable, it is better to leave to the appointing officer an undivided and an unlimited responsibility; and that such a competition can be advantageously used for very many places to which it has not been supposed to be applicable, and, indeed, for nearly all classes of the municipal servants.

We have at the outset, in the application of the new method, been naturally somewhat timid in fixing a very high or rigorous standard. We incline to believe that, so far as we have erred, the error has been in fixing too low rather than too high a standard for the examinations. There has been so much and so varied misinformation about Civil Service reform, and prejudices have been so rife about the scholastic and impracticable nature of the examinations which it was imagined were held, that we have been very naturally tempted to open the door as generously as possible. But upon the examinations it is to be remembered that all are treated alike; no one fails of an appointment by reason of the severity of the examination unless some one else has gotten the appointment through his superior ability to endure it; where many men are in other things equal, the difficulties of the examination, although completely surmounted by none of the competitors, will still bring the ablest and most capable men to the head of the eligible list. And the city is certainly entitled to the very best ability

and capacity which are willing to enter its service. We are, therefore, inclined hereafter to make the examinations as thorough and rigorous as is consistent with the obtaining of eligible lists sufficiently numerous for the needs of the city service.

It is here proper to add, however, that the severity of the test does not refer solely, or even chiefly to literary qualifications. The regulations prescribe and good sense plainly dictates that "the examinations shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of that service to which they seek to be appointed." In but a small number of the places for which we have examined competitors, have we believed literary, or even clerical qualifications to be of the first moment. Nor have we rated them as such. In a large number of places, especially those of policemen, firemen, watchmen and the like, physical strength, agility and endurance, and freedom from physical imperfection, have been deemed and rated as of chief importance. In places like those of draughtsmen, inspectors of building, plumbing, streets or sewers, we have considered practical familiarity with the very work to be done as being the chief point. Upon the examination of candidates for levellers and rodmen in the Engineer's Bureau of the Department of City Works, the chief engineer desired that the appointees should be men scientifically trained, so that they might grow into the places of responsible civil engineers; and it was proposed that they should commence their work at the simplest practical details. On that examination, therefore, we rated technical training very high, and a practical experience as of comparatively little weight. In the case of foremen of street repair gangs, inasmuch as the main quality required was a vigorous, persistent and practical ability to compel laborers to perform their full share of work, and to do it well, we considered actual successful experience shown to have been had in similar work as the chief requisite upon the examination.

Our examinations have, of course, been very unequal during the year. We have ourselves been learning in a new field. In the earlier examinations we did not rate, as we afterwards came to think we ought, the experience and reputation of the candidates as shown by their own statements and those of the persons recommending them, as of material importance in reaching the relative standing upon the eligible list. We at first were content if the certificates as to character merely met the terms of our general rule as to admission to the examination. We made testimonials no part of the competition. We have reached the conclusion, however, that for many places the evidence thus obtained when properly scrutinized and under some limitations, would with a private employer, and ought for that reason with the city, to have great weight. We have, therefore, latterly addressed, and propose in future addressing, as part of every examination, to the candidates and to those who vouch for them, a series of questions calling for specific and detailed information about occupation, experience, habits, character, reputation. These questions will assume as little as possible a categorical form so as to call for testimony in a spontaneous form. The information thus obtained as to each candidate is to be graded precisely as a literary examination would be graded. In places like those of watchmen, policemen, firemen, and other places where habits, character and reputation, are of the utmost importance, this part of the examination would have a large proportional rating.

In each division of the examination, in physique, experience, practical knowledge, reputation and literary merit, a minimum percentage is fixed, below which if the candidate fall, he cannot be placed upon the eligible list however well he may have done in the other divisions of the examination; and on each examination a general minimum of percentage is fixed for admission to the eligible list.

The commission ventures to suggest also that the result of the establishment of the competitive system will probably be to reduce somewhat the number of officers. The personal pressure to fill vacancies being withdrawn, it will doubtless be discovered that some of them the public interest do not require to be filled, and that municipal economy will be promoted by leaving the vacancies unfilled.

Before leaving this preliminary discussion there are two other points we feel bound to notice. We do not believe that the Civil Service examinations have yet attracted as many competent candidates as they will attract hereafter and as the system becomes better known. We believe excellent men have not competed for many places from want of information as to the system, from doubt of its permanence, and last and probably not least, from a lingering and traditional belief that political, if not indeed personal considerations, have the same sort of weight with Civil Service examiners that they have in the past been popularly supposed to have with executive officers. Some of the certificates as to character presented to us bear testimony to the powerful survival of this idea. We do not need, we believe, to say to the mayor that our examinations and ratings have been scrupulously impersonal and free from political or partisan bias. But, we do think it most desirable that it should be widely and definitely known that the introduction of such considerations into the applications of candidates, or into the testimonials sent by those who vouch for them, do the candidates rather harm than good. What the commission wish is the completest information accessible about the candidate of the very kind which would probably weigh with a private employer; and the commission and the candidates as well are hindered by the offer of any other information.

The first Civil Service regulations for Brooklyn were prescribed by the mayor on the 15th of December, 1883. Besides the officers excepted from the operation of the present regulations, as will be hereafter mentioned, there were excepted from the first regulations all positions in the police, health, fire and law departments. The remainder of the civil service of the city was by those regulations divided into four schedules: Schedule A, which included deputies and officers occupying a strictly confidential position; Schedule B which included persons rendering clerical services; Schedule C which included all positions within the rules not included in either of the Schedules A, B, or D, and Schedule D which included laborers and day workmen. Positions in Schedules A and D were exempt from examination; positions in Schedule B, unless filled by promotion, were to be filled solely by competitive examination. Appointments to positions in Schedule C were to be made subject to a qualifying examination by the Civil Service examiners; but the appointing officers could, if they pleased, subject the positions in Schedule C to an open competition or a limited competition. It will be observed, therefore, that the only positions definitely subjected to competition were clerkships in departments other than those of the police, health, fire, law or education. Those clerkships were 129 in number; and only that number of places, therefore, were subject to competition. On the 27th of December, 1883, the mayor by additional regulations, specified more distinctly and in detail the municipal positions within the several schedules. On the 15th of December, 1883, the mayor appointed as members of the examining boards for positions in Schedule B, Messrs. Ethan Allen Doty, John C. Orr, and Edmond F. Olyne; and for positions in Schedule C Edward M. Shepard, Frederic Cronwell, and John H. Schumann.

The first competitive examinations were held on the 28th of December, 1883, and on the 28th of February, 1884, for clerical positions in Schedule B, whose annual salaries were \$1,000 or less, and over \$1,000 but less than \$1,500. Copies of the examination papers are printed in the appendix to this report. There were 127 candidates upon these examinations, and of these seventy-one passed the examination, receiving at least the minimum of seventy per cent. At these examinations candidates were examined at their option in higher arithmetic, letter writing and book-keeping. Copies of the optional papers are also to be found in the appendix. At the beginning of each examination every candidate was required, and the practice has been continued to fill out a preliminary sheet, the form of which is given in the appendix. After signing that sheet the candidate is known and marked simply by his examination number, and the sheet is not referred to until his papers have been marked. The object of this provision is, of course, to secure an impersonal fairness in the rating of papers. In the rating of testimonials and of physique, however, this precaution obviously cannot be fully observed.

Only seven appointments to Schedule C were made subject to a qualifying examination. The examining board rejected none of the appointees nominated to them for such examination. The dates and positions with the names of such appointees are given in the appendix. The examiners at once found that a qualifying examination was very unsatisfactory at the best. The great amount of official machinery required for many separate examinations, the nearness of the appointing officers, the imputations which a rejection of an appointee might seem to cast both upon him and upon the officer who appointed him, the vastly greater ease, certainty and fairness with which examiners could say who were best out of a class than to say whether a single individual were sufficiently competent—these and other considerations speedily rendered the examiners for Schedule C unwilling to continue the “pass” examinations. They therefore urged the mayor, for that reason if for no other, to extend open competition as far as was prudent, and as to places where competition could not wisely be tried to leave to the appointing officer an undivided responsibility.

Upon our mere suggestion the commissioner of buildings, Mr. Gaylor, very willingly assented when he needed to appoint building inspectors, to throw the place open to competition, as the regulations permitted him to do, those places being within Schedule C. On the 3d of March, 1884, an open competitive examination was therefore held for building inspectors. This examination is of interest in the history of the reform as being the first municipal examination of which we know for places of this practical kind, the qualifications for which it had been almost universally supposed could not be determined in an examination. Thirty-one candidates were examined, of whom thirteen reached the eligible list. The success on this examination led to a competitive examination for street inspectors, inspectors of plumbing and foremen of street repair gangs on the 17th of April, 1884. The examination for foremen of street repair gangs was deemed an extreme application of the competitive test, and its result was awaited with much interest and no little anxiety.

The qualifications of a good foreman were obviously not such as could be well detected by any scholastic or literary test. The question was really what knowledge the men had of the work of repairing streets, and what executive ability they would exhibit in directing day laborers. The examination, therefore, called in the first place for an account of the man's former occupation and employment, and what work he had done, and where and for whom he had done it. The exhibit thus made by the candidate of his experience was marked as having a weight of 60 out of 250. The candidate was next examined as to practical details of the work, the tools necessary to a complete gang of laborers, the use of sand in laying pavements, the treatment of a foundation, the work which a paver should do in a day, and other like practical questions, and was finally examined in simple arithmetic, measurements, and other like things necessary to enable him to make proper computations and the simple reports required by the department. The result of this part of the examination was marked as having a weight of 190 out of 250. The result of the examination for foremen was very successful, and created in the examiners very great confidence in the extension of the competitive test to all like places. On the 29th of May, 1884, a competitive examination was held for draughtsmen, levellers and rodmen in the Engineer's Bureau of the Department of City Works. Notices of this examination were sent to many technical schools and colleges, and a most intelligent body of men presented themselves for examination. Professor George W. Plympton, of the Polytechnic Institute, Professor Alfred G. Compton, of the College of the City of New York, and the late Isaac Newton, the chief engineer of the aqueduct department in New York, acted as experts upon this examination.

The experts upon the other examinations were: for building inspectors, Richard B. Eastman, Esq., architect; for foremen of street repair gangs, D. L. Smith, Esq., of the New York water purveyor's office; for plumbing inspectors, Mortimer J. Lyon, Esq., president of the Brooklyn plumbers' association; for sewer inspectors, C. H. Meyers, Esq., of the New York department of public works; for watchmen, Edwin A. Lewis, M. D., police surgeon, of this city; and for street inspectors, J. Rickard, Esq., of the city of New York.

On 12th July, 1884, a competitive examination was held for watchmen in the department of city works. Upon this examination the examiners first tried the experiment of rating the testimonials furnished by those who vouched for the candidates. These testimonials were procured by addressing a circular series of questions to each person so vouching. The result of the use of this circular upon this examination, and upon the later examination for street inspectors, convinced the examiners that it was a most valuable addition to the examination: that the results of the inquiries so made of the persons giving testimonials could be satisfactorily rated; and that in positions like watchmen, inspectors and other officers where absolute integrity and great care are main qualifications, this part of the examination should be given a very large proportion of weight. Upon this examination the examiners also first tried the experiment of rating the physical merit of the candidates numerically. It had hitherto been supposed sufficient, to simply discover by physical examination in the case of policemen and firemen, whether the men were sound. No effort had been made to grade the men who were sound, so that the other qualifications of the candidates being equal, the city might secure the men of the best physique. This the examiners sought to do upon the examination for watchmen, and with success. No candidate was passed who was not marked in physique at least 70 out of 100. The proportional importance given to physique upon this examination was 100 out of 250; to the reputation and character of the candidate as shown by his testimonials 50 out of 250; to the fitness of the occupation and experience of the candidate 50 out of 250; and to the knowledge of reading, writing and simple arithmetic of the candidate 50 out of 250.

On 13th November, 1884, and after the establishment of the present regulations, and the appointment of the present commission, an examination for patrolmen was had, as will appear from the copies of the papers used upon this examination, which are printed in the appendix. No grading was upon this examination attempted in physique, or in character or reputation. Upon future examinations, however, the commission will give ample attention and a distinct rating to these elements, instead of devolving them entirely upon the appointing officer, whose selection is under the regulations limited as to each appointment to the first three names upon the eligible list.

On 8th March, 1884, the commissioner of police, Mr. Partridge, prescribed regulations under the act of 1883, for admission to the police force. He appointed as examiners Messrs. Charles J. Henry, John Rueger and William H. Brownell. The examinations provided by the police regulations were not competitive. Examinations were held, and 41 successful candidates were placed upon the eligible list. The eligible list so formed remained until it was exhausted by appointment therefrom, and a new eligible list under the new regulations was formed upon the examination already mentioned, which was held on 13th November, 1884.

On March 8th, 1884, the Commissioner of Health, Dr. Raymond, prescribed regulations pursuant to the same power given him by the act of 1883. These regulations provided for competitive examinations for the various clerkships in the department, and for qualifying examinations in the other positions.

The commissioner appointed as examiners the secretary of the board and the sanitary inspectors.

It is proper to say that the competitive examinations held for positions requiring special qualifications, like inspectors, foremen and the like, had a success which induced the mayor, when prescribing new regulations under the ampler powers given by the Civil Service act of 1884 (chapter 410), to greatly extend the operation of the competitive test, and to abolish the qualifying examinations.

The success of these competitions had also become known beyond Brooklyn and were very largely instrumental in causing the extension of the competitive test in the new regulations for New York city and for the other cities of the State. It is a matter of very great and justifiable satisfaction that the experiments which the liberal and progressive temper prevailing in the municipal administration of Brooklyn made possible, have had the largest and we believe the most enduring results, and have lain well at the foundation of the present Civil Service policy in the municipalities of the State.

On the 15th August, 1884, the mayor prescribed the new Civil Service regulations, which included the police, fire, health and law departments, which had been excepted from previous regulations. The new regulations were approved by the Civil Service Commission of the State on 26th August, 1884, and took effect on 12th September, 1884. Under these regulations the positions in the municipal service not excepted by the terms of the statute were divided into three schedules. Schedule A included positions of a peculiarly confidential, trust or professional character, and positions having important executive responsibility, and requiring varied and peculiar experience. There were also included in Schedule A, certain appointees of the board of aldermen, the board of elections, and also the Civil Service Commissioners and examiners, and sealers of weights and measures, and one or two others whom it seemed impracticable to place in Schedule B. Schedule B included all other positions excepting those of laborers or day workmen. And Schedule D included laborers and day workmen. Appointments to the positions in Schedules A and D are under the regulations made without examination. All of the positions in Schedule B are subject to an open free competition.

For convenient reference we give in Appendix 1, a list of the positions in the city government excepted from the operation of the Civil Service law ; and in Appendix 2 a list of the positions which by the regulations are placed in Schedule A, and which, as such, are filled by appointment without examination. All other places in the city government, excepting those given in these two appendices and excepting laborers and day workmen, are now filled solely by competitive examination.

The number of positions included in Schedule A and as such excepted from examinations by the regulations, is 93. Of these, however, the eleven Civil Service Commissioners are paid no compensation, and the sealers of weights and measures are paid entirely by fees.

The number of positions included in Schedule B, and as such filled solely upon competitive examination are 1,418, the total salaries paid to the holders of these positions being \$1,466,686. The 1,418 positions in Schedule B are divided as follows:

Clerks, book-keepers, copyists.....	165
Various positions in the department of city works.....	125
Positions in the police.....	714
Positions in the fire department	831
Positions in the health department.....	34
Remaining positions.....	49
	<hr/>
	1,418
	<hr/>

The number of laborers and day workmen employed during the year (omitting December) was 698. Of these 512 were suspended from work or discharged. We suppose the average number in employment at one time was 350. The total average service of the city during the past year was therefore:

Positions excepted from the Civil Service law:	
The mayor and heads of departments, members of commissions, and police justices.....	32
Aldermen,.....	19
Members of board of education.....	45
Teachers and employes under the board of education.....	1,722
Positions in Schedule A, of particular trust or executive responsibility and not subject to competition.....	93
Positions in Schedule B, to which appointments are made solely upon competitive examination.....	1,418
Average number of laborers and day workmen.....	350
	<hr/>

Making the average total number of persons in the service of Brooklyn. . . 3,679

Inasmuch as the Civil Service regulations require this commission, at the beginning of 1885, to prepare the civil list of Brooklyn, containing the name of every person in the employ of Brooklyn, or receiving compensation from the city on the first day of January, together with the title of his office ; the salary or compensation thereto attached, a brief specification of the duties of the office and other like data, the commission will trust, in its next annual report, to give, with more completeness, the general data relating to the persons in the municipal service than it is now able to give.

Appendix 3 contains a table showing the number of competitors in the competitive examinations so far held for each class of positions, the sort of education, if any, which the competitors had had, and the average age of the competitors, and also showing the number of competitors who were successful in reaching the eligible list, with the same data, and also, in aggregate, the places of birth of the persons upon such lists.*

Appendix 4 gives the various eligible lists formed upon the competitive examinations so far had, with the age and numerical rating of the different persons upon such lists.

Appendix 5 shows the number of promotions made under the Civil Service regulations, which were made upon competitive examinations, and by whom those examinations were conducted.

Appendix 6 shows the number of persons whose names were stricken from eligible lists; the number of persons appointed from eligible lists, who were discharged from the positions to which they were appointed during or at the end of their probation as not being satisfactory; who were discharged because the work upon which they were engaged was finished, and who left their positions simply of their own wish — in each case, the classes being indicated. Appendix 7 gives the various papers of questions used upon the various examinations.

Appendix 8 shows the total number of appointments of laborers or day workmen, being the civil employes included in Schedule D, and their removal or suspension by reason of cessation of work made since the 1st of January, 1884, the table also showing the number of such appointments, removals and suspensions made during each month to the 1st of December, 1884.

Appendix 9 contains a list of the appointments made under the regulations now superseded, subject to a qualifying examination by the examiners in the old Schedule C.

The entire expenditure upon the Civil Service work for the first year has been \$1,330.44; and there are some outstanding charges, which may amount to \$75. Appendix 10 shows the detail of this expenditure.

The commission feel bound in conclusion to express to the mayor their very high appreciation of the services of Joseph W. Sutphen, Esq., designated by the mayor to act as secretary to the commission. In the absence of settled forms and methods of procedure, amid the embarrassments connected with inaugurating a new experiment, and during the establishment of new and radically different methods in municipal administration, Mr. Sutphen's patience, industry and highly intelligent loyalty to the general plan of the reform have been invaluable to the commission and to the reform itself.

Respectfully,

ETHAN ALLEN DOTY,
Chairman of the commission.
 EDWARD M. SHEPARD,
 JOHN H. SCHUMANN,
 EDMOND F. CLYNE,
 WM. H. BROWNELL,
 CHAS. J. HENRY,
 JOHN RUEGER,
 J. FRED MOORE, M. D.,
 HENRY M. LEWIS, M. D.,
 ISAAC H. CARY,
 A. AUGUSTUS HEALY.
Commissioners.

APPENDIX 3.

Showing number of persons who have entered the Competitive Examination, with their education, average age, etc.

EXAMINATION FOR	Number of competitors.	Number having collegiate education.	Number having scientific education.	Number having academic education.	Number having common school education.	Number of successful competitors having common school education.	Difference in age limit.	Average age.	Number who were successful in reaching the eligible list.	Number of successful competitors having common school education.	Average age of successful competitors.	Limit of ages of successful competitors.	Number of successful competitors actually appointed so far.
	Years.	Years.	Years.	Years.	Years.	Years.	Years.	Years.	Years.	Years.	Years.	Years.	Years.
1st.	127	11	49	67	21 to 74	21	35.4	71	28	1	22.7	21 to 61	21
2d.	21	...	1	20	24 to 68	12	46	18	1	...	40.9	28 to 46	5
3d.	23	...	...	23	30 to 73	17	45.7	17	...	...	46.1	34 to 53	11
4th.	6	...	...	5	21 to 51	4	35	4	...	...	38	23 to 33	1
5th.	14	3	2	...	19 to 38	1	39	1	...	...	23	21 to 28	1
6th.	20	11	3	...	40 to 63	10	27.8	11	...	...	22.9	19 to 25	1
7th.	23	11	7	...	25 to 75	6	24.5	10	...	...	20.8	19 to 25	1
8th.	7	...	...	7	25 to 75	7	45.5	6	...	...	43.6	40 to 50	3
9th.	34	...	3	31	29 to 54	13	44.7	8	...	...	46.8	34 to 45	3
10th.	21	...	...	21	23 to 45	61	43.4	13	...	...	41.1	30 to 45	3
11th. Patrolmen, etc.	134	...	...	134	...	...	28.6	61	...	...	27.9	23 to 43	41
Totals.....	421	96	65	317	...	146	...	215	...	36	...	...	95

The places of birth of the persons who succeeded in reaching the eligible list were as follows:

United States.....	137	East India.....	1
Ireland.....	31	West India.....	1
Germany.....	4	France.....	1
Scotland.....	3	Names stricken from list.....	3
England.....	3		
Russia.....	1		
Prussia.....	1	Total.....	215

CITY OF UTICA.

MAYOR'S OFFICE.

1. Number of positions (exclusive of laborers) exempt from examination under the regulations, 21.
2. Number of positions subject to examination under the regulations, with the aggregate annual amount of compensation of all such positions, 108, \$41,415.
4. Number of persons who have entered the competitive examinations, giving their average age and their education, viz., whether common school, academic or collegiate; *i. e.*, the number of each. Engineers, 2; stokers, 5; drivers in fire department, 3; education, common school.
5. Number of those examined who have passed the minimum, 10.
6. Number of those selected for employment, giving their average age and their education as above; none selected as yet.
7. Number of those discharged during or at end of probationary period, none.
8. Number of positions to be filled when vacant by non-competitive examination, 2.
10. Number of those discharged during or at end of probationary period, none.
11. Names of the examiners, giving the schedules; Hon. Theodore S. Sayre, Thomas F. Baker, Arthur H. Ballou.
12. Copies of the examination papers used in the several examinations. The examination was oral, one applicant at a time being examined and all being asked the same questions.

J. S. SHERMAN,

*Mayor.**December 17, 1884.*

CITY OF AUBURN.

MAYOR'S OFFICE,
AUBURN, N. Y., *December 4, 1884.* }

1. Number of positions (exclusive of laborers) exempt from examination under the regulations; 3 commissioners of excise.
2. Number of positions subject to examination under the regulations, with the aggregate annual amount of compensation of all such positions; 28, \$17,660.
3. Number of such positions subject when vacant to be filled by selection from those who have passed in competitive examinations, giving separately the number of positions as clerks, policemen, firemen, etc., so far as may be conveniently classified, 17 policemen.
4. Number of persons who have entered the competitive examinations, giving their average age and their education, viz., whether common school, academic or collegiate; *i. e.*, the number of each, 14; average age, 33 years and 25 days; of these 13 received a common school and a business college education.
5. Number of those examined who have passed the minimum, 9.
6. Number of those selected for employment, giving their average age and their education as above. One, age 31 years, common school and business college education.
7. Number of those discharged during or at the end of probationary period; none, but one has been appointed under regulations and has been on duty but 4 days.
8. Number of positions to be filled when vacant by non-competitive examination, 11; optional, however, with officers or board of appointment.
9. Number of persons subjected to non-competitive examination, and number passed as qualified and subsequently employed; none.
10. Number of those discharged during or at end of probationary period; none.

11. Names of the examiners, giving the schedules: Bradley A. Tuttle, chairman; George Underwood and Charles O'Brien, associates; Millard H. Olmsted, secretary.

12. Copies of the printed examination papers used in the several examinations. Papers not printed, examination in writing so far.

Very respectfully yours,

C. WHEELER, Jr.,
Mayor.

THE CITY OF COHOES.

The whole number of positions in the public service of the city of Cohoes, N. Y., subject to Civil Service regulations, and so far classified as to show the number in the various departments of the service, together with the salaries paid to the persons holding the positions embraced under the regulations are as follows:

SCHEDULE A.

There are at present no positions included in this department.

SCHEDULE B.

Positions.	Salary.
City clerk.....	\$800 00
Superintendent of streets and public grounds.....	800 00
Overseer of the poor.....	800 00
City engineer and surveyor.....	500 00
Superintendent of the city cemetery.....	50 00
Sealer of weights and measures.....	No salary.
Pound master.....	No salary.
Superintendent of water works.....	\$700 00
Captain of police.....	1, 100 00
Sergeant of police.....	1, 000 00
Acting sergeant of police and nine patrolmen, court officer \$900 each.....	9, 900 00
Station-house keeper.....	500 00
Chief engineer of the fire department.....	900 00
Clerk of board of fire commissioners.....	50 00
Clerk of the board of commissioners of excise.....	150 00
Recorder of the city of Cohoes.....	2, 000 00

SCHEDULE C.

City attorney.....	600 00
Surgeon of police.....	100 00
Health officer.....	600 00

1. Number of positions (exclusive of laborers) exempt from examination under the regulations: 78, including teachers in public schools, of whom there are 55. This does not mean elective offices.

2. Numbers of positions subject to examination under the regulations with the aggregate annual amount of compensation of such positions; 29, \$20,550.

3. Number of positions to be filled when vacant by non-competitive examination.

ALFRED LEROY,
Mayor.

Dated December 22, 1884.

APPENDIX H.

STATE ACT, RULES, REGULATIONS, ETC.

ORGANIZATION OF THE NEW YORK CIVIL SERVICE COMMISSION.

COMMISSIONERS.—John Jay, New York; Augustus Schoonmaker, Kingston. Henry A. Richmond, Buffalo.

OFFICERS, ETC.—President, John Jay; Chief Examiner, Silas W. Burt; Secretary, Clarence B. Angle; Stenographer, —————; Messenger and Clerk, John C. Birdseye.

General office in Capitol, Albany.

GENERAL BOARD OF EXAMINERS AT ALBANY.—Hiram E. Sickels, Chairman; Charles W. Cole, Willis E. Merriman, Richard G. Milks, John G. Clifford, Secretary.

THE CIVIL SERVICE STATUTES.

An Act to regulate and improve the Civil Service of the State of New York, (Chap. 354), passed May 4, 1883, as amended by chapter 357, passed May 24, 1884, and chapter 410, passed May 29, 1884.

SECTION 1. The governor is authorized to appoint, by and with the advice and consent of the senate, three persons, not more than two of whom shall be adherents of the same party, as Civil Service Commissioners, and said three commissioners shall constitute the New York Civil Service Commission. They shall hold no other official place under the State of New York. The governor may remove any commissioner; and any vacancy in the position of commissioner shall be so filled by the governor, by and with the advice and consent of the senate, as to conform to said conditions for the first selection of commissioners. The three commissioners shall each receive a salary of two thousand dollars a year. And each of said commissioners shall be paid his necessary traveling expenses incurred in the discharge of his duty as a commissioner.

§ 2. It shall be the duty of said commission:

FIRST. To aid the governor, as he may request, in preparing suitable rules for carrying this act into effect; and when said rules shall have been promulgated, it shall be the duty of all officers of the State of New York, in the departments and offices to which any such rules may relate, to aid, in all proper ways, in carrying said rules, and any modification thereof, into effect.

SECOND. And among other things, said rules shall provide and declare, as nearly as the conditions of good administration will warrant, as follows:

1. For open, competitive examinations for testing the fitness of applicants for the public service now classified or to be classified hereunder. Such examinations shall be practical in their character and, so far as may be, shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of that service into which they seek to be appointed.

2. All the offices, places and employments so arranged or to be arranged in classes shall be filled by selections from among those graded highest as the results of such competitive examinations.

3. There shall be a period of probation before any absolute appointment or employment aforesaid.

4. Promotions from the lower grades to the higher shall be on the basis of merit and competition.

5. No person in the public service is for that reason under any obligation to contribute to any political fund, or to render any political service, and no person shall be removed or otherwise prejudiced for refusing to do so.

6. No person in said service has any right to use his official authority or influence to coerce the political action of any person or body.

7. There shall be non-competitive examinations when competition may not be found practical.

8. Notice shall be given in writing by the appointing power to said commission of the person selected for appointment or employment from among those who have been examined, of the place of residence of such persons, of the rejection of any such persons after probation, of transfers, resignations, and removals, and of the date thereof, and a record of the same shall be kept by said commission. And any necessary exceptions from said eight fundamental provisions of the rules shall be set forth in connection with such rules, and the reasons therefor shall be stated in the annual reports of the commission.

THIRD. Said commission shall, subject to the rules that may be made by the governor, make regulation for, and have control of such examinations, and, through its members or the examiners, it shall supervise and preserve the records of the same; and said commission shall keep minutes of its own proceedings.

FOURTH. Said commission may make investigations concerning the facts, and may report upon all matters touching the enforcement and effect of said rules and regulations, and concerning the action of any examiner or board of examiners hereinafter provided for, and its own subordinates, and those in the public service, in respect to the execution of this act; and in the course of such investigations, each commissioner and their secretary shall have power to administer oaths.

FIFTH. Said commission shall make an annual report to the governor for transmission to the legislature, showing its own action, the rules and regulations and the exceptions thereto in force, the practical effects thereof, and any suggestion it may approve for the more effectual accomplishment of the purposes of this act.

*§ 3. Said commission is authorized to employ a chief examiner, a part of whose duty it shall be under its direction to act with the examining boards so far as practicable, whether at Albany or elsewhere, and to secure accuracy, uniformity and justice in all their proceedings, which shall be at all times open to him. The chief examiner shall be entitled to receive a salary at the rate of thirty-six hundred dollars a year, and he shall be paid his necessary traveling expenses incurred in the discharge of his duty. The commission is authorized to employ a secretary, who may be one of its own number, who shall receive a compensation of one thousand dollars per annum, and who shall also be paid his necessary traveling expenses incurred in the discharge of his duty, and also a person to act as stenographer and copyist, who shall be entitled to receive a compensation of one thousand dollars a year, or in its discretion may from time to time employ stenographers and copyists at an expense not to exceed in the aggregate the sum of one thousand dollars a year. The commission may appoint a messenger, to act also as clerk, at a salary not exceeding nine hundred dollars a year, and may dismiss him at pleasure. The commission may, at Albany and in any other part of the State where examinations are to take place, designate and select a suitable number of persons in the official service of the State of New York, after consulting the head of the department or office in which such person serves, or in its discretion, persons not in the official service, to be mem-

bers of boards of examiners, and may at any time substitute any other person in or out of such service in place of any one so selected. Any person not at the time in the official service of the State, or of any political division thereof serving as a member of the board of examiners, shall be entitled to compensation for every day actually and necessarily spent in the discharge of his duty as examiner at the rate of five dollars a day, but the aggregate compensation of any such examiner shall not exceed one hundred dollars in any year. It shall be the duty of the officers of the State of New York, or of any political division thereof, at any place outside of the city of Albany where examinations are directed by said rules or by said board to be held, to allow the reasonable use of the public buildings, and to light and heat the same, for holding such examinations and in all proper ways to facilitate the same.

*§ 4. It shall be the duty of the trustees of public buildings, designated by chapter three hundred and forty-nine of the laws of eighteen hundred and eighty-three, to cause suitable and convenient rooms and accommodations to be assigned or provided, and to be furnished, heated and lighted at the city of Albany for carrying on the work of said commission and said examinations, and said commission may order the necessary stationery, postage stamps, an official seal and other articles to be supplied, and the necessary printing to be done for its official use. And the cost and expense thereof, and the several salaries, compensations and necessary expenses of the commission, upon the same being stated in detail and verified by affidavit as the comptroller may direct, shall be paid monthly from any money in the treasury not otherwise appropriated.

†§ 5. Any commissioner, examiner, copyist, or messenger herein mentioned, or any other person who shall willfully and corruptly, by himself or in co-operation with one or more persons, defeat, deceive, or obstruct any person in respect of his or her right of examination according to any rules or regulations prescribed pursuant to the provisions of this act, or who shall willfully, corruptly, and falsely mark, grade, estimate, or report upon the examination or proper standing of any person examined pursuant to the provisions of this act, or aid in so doing, or who shall willfully and corruptly make any false representations concerning the same, or concerning the person examined, or who shall willfully and corruptly furnish to any person any special or secret information for the purpose of either improving or injuring the prospects or chances of any person so examined or to be examined, shall for each offense be deemed guilty of a misdemeanor.

§ 6. Within four months after the expiration of the present session of the legislature, it shall be the duty of the governor to cause to be arranged in classes the several clerks and persons employed or being in the public service, for the purposes of the examination herein provided for, and he shall include in one or more of such classes, so far as practicable, all subordinate places, clerks and officers in the public service of the State.

§ 7. After the termination of eight months from the expiration of the present session of the legislature, no officer or clerk shall be appointed, and no person shall be admitted to or be promoted in either of the said classes now existing, or that may be arranged hereunder pursuant to said rules, until he has passed an examination, or is shown to be specially exempted from such examination, in conformity herewith. No elective officer, and no person merely employed as a laborer or workman, shall be required to be classified hereunder; nor, unless by the direction of the senate, shall any person who has been nominated for confirmation by the senate be required to be classified or to pass an examination.

‡§ 8. The mayor of each city in this State is authorized and is hereby directed to prescribe such regulations for the admission of persons into the Civil Service of such city as may best promote the efficiency thereof and ascertain the fitness of candidates in respect to character, knowledge and ability for the branch of the

* As amended by section 2 of chapter 357, passed May 24, 1884.

† As amended by section 1 of chapter 410, passed May 29, 1884.

‡ As amended by section 2, chapter 410, passed May 29, 1884.

service into which they seek to enter, and for this purpose he shall from time to time employ suitable persons to conduct such inquiries and make examinations, and shall prescribe their duties and establish regulations for the conduct of persons who may receive appointments in the said service. And the regulations so to be prescribed shall, among other things, provide and declare as in the second subdivision of the second section of this act is provided and declared in reference to regulations for admission to the Civil Service of the State. Within two months after the passage of this act, it shall be the duty of each of said mayors in and by such regulations to cause to be arranged in classes the several clerks and persons employed or being in the public service of the city of which he is mayor, and he shall include in one or more of such classes, so far as practicable for the purposes of the examination herein provided for, all subordinate clerks and officers in the public service of the said city to whom his power under this act extends. After the termination of three months from the passage of this act no officer or clerk shall be appointed, and no person shall be admitted to or be promoted in either of the said classes now existing or that may be arranged hereunder pursuant to said rules, until he has passed an examination, or is shown to be exempted from such examination, in conformity with such regulations. Such regulations hereafter prescribed and established, and any subsequent modification thereof, shall take effect upon the approval of the New York Civil Service Commission. Officers elected by the people, and the subordinates of any such officer for whose errors or violation of duty said officer is financially responsible, and the head or heads of any department of the city government, and persons employed in or who seek to enter the public service under the educational departments of any city, and any subordinate officer who, by virtue of his office, has personal custody of public moneys or public securities, for the safe keeping of which the head of an office is under official bonds, shall not be subject to the regulations prescribed pursuant to this section, nor shall any regulations contravene an existing statute relating to entrance to said service. It shall be the duty of all those in the official service of any such city to conform to and comply with any regulations made pursuant to this act, and to aid and facilitate in all reasonable and proper ways the enforcement of all regulations and the holding of all examinations which may be required under the authority conferred by this section. But the authority by this section conferred shall not be so exercised as to take from any policeman or fireman any right or benefit conferred by law, or existing under any lawful regulation of the department in which he serves. And all examinations herein authorized shall be public, and all regulations shall be published, and, with all the proceedings and papers connected with said examinations, shall be at all times subject to the inspection of said commission and its agents; and said commission shall set forth in its reports the character and practical effects of such examinations, together with its views as to the improvement and extension of the same, and also copies of all regulations made under the authority hereby conferred.*

§ 9. No recommendation of any person who shall apply for office or place under the provisions of this act, which may be given by any senator or member of assembly, or officer confirmed by the senate, or judge of any court, except as to the character or residence of the applicant, shall be received or considered by any person concerned in making any examination or appointment under this act.

(§ 10 repealed by § 7 of chap. 357, passed May 29, 1884).

† § 11. No officer, agent, clerk or employe under the government of the State of New York or any political division thereof shall directly or indirectly use his authority or official influence to compel or induce any other officer, clerk, agent or employe under said government, or any political division thereof, to pay or promise to pay any political assessment. Every said officer, agent or clerk, who may have charge or control in any building, office or room occupied for any purpose of said government, or any said division thereof, is hereby authorized

* See section 8 of chapter 410, passed May 29, 1884.

† As amended by section 8 of chapter 357, passed May 24, 1884.

to prohibit the entry of any person, and he shall not consent that any person enter the same for the purpose of therein making, collecting, receiving or giving notice of any political assessment; and no person shall enter or remain in any said office, building or room, or send or direct any letter or other writing thereto, for the purpose of giving notice of, demanding or collecting, nor shall any person therein give notice of, demand, collect or receive any such assessment; and no person shall prepare or make out, or take any part in preparing or making out, any political assessment, subscription or contribution with the intent that the same shall be sent or presented to or collected of any officer, agent or employe subject to the provisions of this act, under the government of the State of New York, or that of any political division thereof, and no person shall knowingly send or present any political assessment, subscription or contribution to or request its payment of any said officer, agent or employe.

* § 12. Any person who shall be guilty of violating any provision of the last section shall be deemed guilty of a misdemeanor, and shall, on conviction thereof, be punished by a fine not less than fifty dollars and not exceeding one thousand dollars, or by imprisonment for a term not exceeding six months, or by both such fine and imprisonment, in the discretion of the court.

§ 13. No recommendation or question under the authority of this act shall relate to the political opinions or affiliations of any person whatever.

§ 14. Whoever while holding any public office, or in nomination for, or while seeking a nomination or appointment for any public office, shall corruptly use or promise to use, whether directly or indirectly, any official authority or influence (whether then possessed or merely anticipated), in the way of conferring upon any person, or in order to secure or aid any person in securing any office or public employment, or any nomination, confirmation, promotion or increase of salary, upon the consideration or condition that the vote or political influence or action of the last-named person, or any other, shall be given or used in behalf of any candidate, officer or party, or upon any other corrupt condition or consideration, shall be deemed guilty of bribery or an attempt at bribery. And whoever, being a public officer, or having or claiming to have any authority or influence for or affecting the nomination, public employment, confirmation, promotion, removal, or increase or decrease of salary of any public officer, shall corruptly use or promise or threaten to use any such authority or influence, directly or indirectly, in order to coerce or persuade the vote or political action of any citizen, or the removal, discharge or promotion of any officer or public employe, or upon any other corrupt consideration, shall also be guilty of bribery or of an attempt at bribery. And every person found guilty of such bribery or of an attempt to commit the same, as aforesaid, shall, upon conviction thereof, be liable to be punished by a fine of not less than one hundred dollars nor more than three thousand dollars, or to be imprisoned not less than ten days nor more than two years, or to both said fine and said imprisonment in the discretion of the court. The phrase "public officer" shall be held to include all public officials in this State, whether paid directly or indirectly from the public treasury of the State, or from that of any political division thereof, or by fees or otherwise; and the phrase "public-employe" shall be held to include every person not being an officer who is paid from any said treasury.

§ 15. A majority of the members of said board shall constitute a quorum, but a less number may adjourn from day to day. Said commission, when organized, shall immediately inquire into the methods of appointment, removal, terms of service, duties, compensation and numbers of all clerks, employes or subordinate officers of any nature whatsoever, either to this State or of cities or counties therein, having a population exceeding fifty thousand inhabitants, who are not, by existing laws, appointed by the governor of the State or by the mayor of any city, or elected by the people; and whether the action of political parties or the public acts of official servants are in any wise affected, and if so to what degree, by the present methods of such appointments, tenure of office, removals and compensations, and whether the public interest would or would not be advanced

* As amended by section 4 of chapter 857, passed May 24, 1884.

by prescribing competitive tests of standards of appointment for any or all of such subordinate public servants, in addition to those who are hereinbefore included, and if so, the nature and extent of such tests or standards; and whether any abuses exist in connection with the existing practices touching said appointment, tenures, compensations or removals that require reform, or that may be abated by legislation or otherwise. Said commission may also further extend its inquiries so far as to enable it to report whether any, and if so what legislation is expedient, relative to the methods and amounts of compensation of all county officers and their subordinates in this State.

*§ 16. Said commission shall have like power to secure, by its subpoena, the attendance and testimony of witnesses, and the production of books and papers pertinent to the investigations and inquiries hereby authorized, to that prescribed in and by chapter three hundred and fifty-three of the laws of eighteen hundred and eighty-two, for the commission thereby constituted in the execution of its duties as in said act last mentioned; and witnesses and officers to subpoena and secure the attendance of witnesses before said commission shall be entitled to the same fees as are allowed witnesses in civil suits in courts of record. Such fees need not be prepaid, but the comptroller shall draw his warrant for the payment of the amount thereof when the same shall have been certified to by the president of the commission, and duly proved by affidavit or otherwise to the satisfaction of the said comptroller; and all State, county, town, municipal and other officers and their deputies, clerks, subordinates and employes shall afford the said board all reasonable facilities in conducting the inquiries specified in this act, and give inspection to said board of all books, papers and documents belonging, or in any wise appertaining to their respective offices, and also shall produce said books and papers, and shall attend and testify when required to do so by said commission.

§ 17. Said commissioners hereinbefore named, or in case of vacancy from among their number by declination, resignation or otherwise, a successor commissioner to be appointed by the governor, shall qualify by filing with the secretary of State an oath to perform faithfully the duties of such commissioner. Each commissioner shall receive the compensation hereinbefore provided, together with his actual traveling expenses in the discharge of his duties as such commissioner, the said salaries and expenses, together with the other necessary expenses of said board, to be approved by the comptroller and thereafter paid out of the treasury of this State; and the sum of fifteen thousand dollars, or so much thereof as may be necessary, is hereby appropriated out of any moneys in the State treasury not otherwise appropriated for the purposes stated in this act.

* As amended by section 5 of chapter 357, passed May 24, 1884.

SUPPLEMENTARY PROVISIONS.

CHAP. 357.

AN ACT to amend chapter three hundred and fifty-four of the laws of eighteen hundred and eighty-three, entitled "An act to regulate and improve the Civil Service of the State of New York."

PASSED May 24, 1884; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. (Amends section three of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

§ 2. (Amends section four of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

§ 3. (Amends section eleven of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

§ 4. (Amends section twelve of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

§ 5. (Amends section sixteen of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

§ 6. The sum of one thousand dollars is hereby appropriated out of any unexpended balance in the treasury, to meet any expense incurred by section five of this act; which expense the treasurer shall pay on the warrant of the comptroller.

§ 7. Section ten of said act is hereby repealed.*

§ 8. The election officers now in office, and the inspectors of election and poll clerks shall be exempt from examination in accordance with the act hereby amended, or the amendments thereof, and it shall be the duty of the commissioners and mayors of cities so to provide in regulations made under said act.

§ 9. This act shall take effect immediately.

CHAP. 410.

AN ACT to amend chapter three hundred and fifty-four of the laws of eighteen hundred and eighty-three, entitled "An act to regulate and improve the Civil Service of the State of New York."

PASSED May 29, 1884; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. (Amends section five of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

§ 2. (Amends section eight of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.)

* Refers to section ten of chapter three hundred and fifty-four, Laws of eighteen hundred and eighty-three.

§ 3. Where before the passage of this act the mayor of any city herein mentioned has prescribed regulations pursuant to the power given him by the act hereby amended, such regulations shall be deemed to be established and prescribed and to be operative as if established, prescribed, and approved under the provisions of the said act as hereby amended; and the examiners who before the passage of this act have by the mayor of any such city been appointed or designated under the provisions of the said act, shall be deemed to be appointed and to have all the powers and duties which they would have if appointed under the provisions of the said act as hereby amended.

§ 4. In grateful recognition of the services, sacrifices and sufferings of persons who served in the army or navy of the United States in the late war, and have been honorably discharged therefrom, they shall be preferred for appointment to positions in the Civil Service of the State and of the cities affected by this act over other persons (of equal standing) as ascertained under this act and the act hereby amended, and the person thus preferred shall not be disqualified from holding any position in said Civil Service on account of his age nor by reason of any physical disability, provided such disability does not render him incompetent to perform the duties of the position applied for.

STATE OF NEW YORK:

EXECUTIVE CHAMBER,
ALBANY, *June 30, 1884.*

In the exercise of the authority conferred upon the governor by Chapter 354, Laws of 1883, entitled "An act to regulate and improve the Civil Service of the State of New York," and the acts amendatory thereof,

I, Grover Cleveland, governor of the State of New York, do hereby promulgate the following rules for the regulation of the Civil Service of the said State, and all officers and persons in the Civil Service of the State and persons seeking to enter said service will govern themselves accordingly.

Done at the Capitol in the city of Albany, this the 30th day of June, in the year of our Lord one thousand eight hundred and eighty-four.

GROVER CLEVELAND.

RULE 1.

In these rules, and the regulations thereunder, the term "Commission" indicates the Civil Service Commission of the State of New York, and the terms "class," "subdivision" and "grade" are those established by the classification of the Civil Service of the State, approved by the governor, September 3, 1883, and the positions now comprised in, or hereafter entered in, such classification shall, in the aggregate, be taken as the Civil Service of the State referred to herein, and the term "public service" shall be taken to comprehend all persons in the service of the State, without regard to such classification.

RULE 2.

No person in the public service is, for that reason, under any obligation to contribute to any political fund or purpose, or to render any political service, and no person shall be removed or otherwise prejudiced for refusing so to do.

RULE 3.

No person in the public service has the right to use his official authority or influence to coerce the political action of any person or body.

RULE 4.

For the purpose of indicating the manner in which selections shall be made for filling the positions in the Civil Service, when vacan-

such positions shall be enrolled by class, subdivision, grade or name in some one of the five schedules, designated respectively as A, B, C, D, and E, which schedules are hereunto annexed and form a part of these rules. The right is reserved to transfer, hereafter, any position from one schedule to another, as, from time to time, the conditions of good administration or the general interests of the public service may require, in which case prompt publication of any such transfer will be made to all concerned.

RULE 5.

Schedule A shall include the deputies of principal officers, duly authorized by law to act for their principals; all officers, clerks and others whose official relations are necessarily strictly confidential to the head of the office in which they serve; officers or others under official bonds as security for the collection, custody or disbursement of public moneys, or who, by virtue of their position, have the custody of public moneys for the safe-keeping of which any officer must give bonds, and such other positions as may now or hereafter be included in this schedule, according to law, and such schedule shall comprise the following positions:

CLASS 1.

Subdivision II.

In the governor's office, the private secretary, the pardon clerk and the stenographer; in the office of the secretary of State, the deputy secretary; in the office of the comptroller, the deputy comptroller and confidential clerk; in the office of the treasurer, the deputy treasurer, the chief clerk, the book-keeper and the pay-clerk; in the office of the attorney-general, the two deputies and the confidential clerk; in the office of the state engineer and surveyor, the deputy; the deputy superintendent of public instruction; the deputy superintendent and special examiners of the banking department; in the insurance department, the deputy, the chief clerk, the actuary and the private secretary; in the department of public works, the three assistant superintendents, the special agent and the financial clerk; the clerk of the superintendent of prisons; the clerk, deputy clerk and reporter of the court of appeals; the secretaries of the railroad commission, the board of health, the board of charities, the commissioners of emigration, and the Civil Service Commission; the chief examiner of the Civil Service; the treasurers of asylums; the game and fish protectors, and the superintendent of public buildings; principals, professors and teachers in normal schools; chief clerks of courts; counsel and cashier of excise board of New York.

RULE 6.

The appointments to positions comprised in Schedule A may be made without examinations under these rules, but such examinations may be had upon the request of the appointing officer. Appointing officers must notify the commission, in writing, of all appointments to such positions within five days after the same are made.

RULE 7.

Schedule B shall include the following:

CLASS 1.

All clerks and other persons of whatever designation, rendering services similar to those of clerks in any branch of the State services, in the following grades :

Subdivision I.

First Grade — Clerks and like employes receiving an annual compensation of less than \$1,000.

Second Grade — Clerks and like employes receiving an annual compensation of \$1,000 or more, but less than \$1,200.

Third Grade — Clerks and like employes receiving an annual compensation of \$1,200 or more, but less than \$1,500.

CLASS 2.

Civil engineers and surveyors; chemists.

CLASS 3.**Subdivision II.**

Superintendents and assistant superintendents in charge of public buildings under the general superintendent.

Subdivision III.

Office messengers and orderlies in the courts, offices and public buildings at Albany. Interpreters in courts.

Subdivision IV.

All steam engineers.

CLASS 4.

In department of public works.

Subdivision II.

Inspectors of boats and cargoes.

Subdivision III.

First Grade — Rodmen and levelmen.

Second Grade — Assistant engineers below the rank of resident.

CLASS 6.

In prisons and reformatories.

Subdivision II.

Physicians.

Subdivision III.

First Grade — Guards in prisons and reformatories.

Subdivision IV.

Steam engineers.

Subdivision V.

First Grade — Teachers in reformatories receiving an annual compensation of less than \$500.

CLASS 7.

In asylums, hospitals and similar institutions and by the commissioners of emigration.

Subdivision VII.

First Grade—Teachers receiving an annual compensation of less than \$500.

RULE 8.

Appointments shall be made or employment shall be given in the positions in Schedule B by selection from those persons graded highest as the results of open competitive examinations.

RULE 9.

The competitive examinations shall be practical in their character, and with paramount regard to those matters which will fairly test the relative capacity and fitness of the persons examined for the service which they seek to enter. The examinations shall be held at such times and places as the Commission may designate, and ten days' previous notice of each examination will be mailed to all eligible applicants of record. Special regulations, in which the particular conditions (if any) of the examination will be specified, will be issued, when deemed expedient by the Commission, prior to the examinations.

RULE 10.

All regular applications for admission to such competitive examinations will be on blanks in a form prescribed by the Commission and the applicant must state therein on oath, and in his own handwriting: 1. His full name, residence and post-office address. 2. His term of residence in this State. 3. His citizenship. 4. His date of birth. 5. His place of birth. 6. His previous employment in the public service, if any. 7. His business or employment for the last preceding five years. 8. His education. 9. If in the military or naval service of the United States in the late war, give name of organization or vessel to which attached, date of enlistment or commission, position or rank, date and cause of discharge from the service, and any physical disability incurred in such service. 10. Such other information must be furnished as the Commission may reasonably require, touching the applicant's fitness for the public service.

The application must be accompanied (1) by a certificate of a practicing physician in good repute, that he has examined the applicant and found him free from any physical defect or disease that would be likely to interfere with the proper discharge of his duties in the position in the Civil Service sought by such applicant; and (2) by the certificate of not less than three, nor more than five reputable citizens of this State, that they have been personally acquainted with the applicant for at least one year, and believe him to be of good moral character, of temperate and industrious habits, and in all respects fit for the service which he wishes to enter, and that they are willing that such certificate shall be published for public information. The applicant must also state in his application the grade or subdivision in the schedule he seeks to enter, and whether he limits such application to any particular department, office or institution.

RULE 11.

Defective applications will be suspended and applicants notified to amend the same, but no such notice will be given or opportunity granted a second time. Whenever the application shows that the applicant is not within the prescribed limits of age, or otherwise not qualified under the rules and regulations, or is manifestly unfit for the service, the application will be rejected.

RULE 12.

The date of the reception of all applications shall be indorsed thereon, and entered of record by the Commission, and if the applicants for admission to any grade or subdivision are in excess of a number that can be examined at a single examination, they will be notified to appear in their order on the respective records, provided that persons who have been honorably discharged from the military or naval service of the United States in the late war shall have precedence in such notification.

RULE 13.

For the purpose of making examinations of applicants from time to time as may be required, the Commission will designate and select at Albany and other places a suitable number of persons to be members of boards of examiners, and will duly commission such persons as examiners; and the Commission may at any time substitute any other person in place of any one so selected. When persons selected as examiners are in the official service of the State, the head of the department or office in which such persons serve shall be consulted; and in the discharge of their duties as examiners the persons so selected from the official service will be responsible solely to the Commission, and will act under its regulations and direction.

RULE 14.

Under the direction of the Commission the chief examiner will prepare a list of subjects of examination for the several grades and subdivisions in this schedule upon which each applicant must be examined. To such list of obligatory subjects there may be added certain other subjects in which the applicant may be examined or not, at his option. The general standing of each applicant shall depend solely upon his relative proficiency in the obligatory subjects. For the purpose of determining the general average standing, certain relative weights will be given to the obligatory subjects, which weights shall be adjusted to the relative importance of the subjects.

RULE 15.

No person whose standing on any obligatory subject is less than fifty, or whose ascertained average standing on all the obligatory subjects is less than seventy, will be entered upon the eligible list.

RULE 16.

The names of the persons who have passed above the minimum, as set forth in the previous rule, will be entered upon a register in the order of their excellence, and opposite each name will be entered the standing of such person in each optional subject in which he may have been examined.

RULE 17.

1. Whenever any officer having the power of appointment to or employment in any grade or subdivision in this schedule shall so request, the Commission shall certify to him the names of three eligible persons who are graded highest on the proper register, indicating such of them (if any) as have been honorably discharged from the military or naval service of the United States in the late war.

2. From the three persons whose names are so certified the officer shall make a selection to fill the vacant place, subject, however, to the provisions of Rule 44, giving preference in appointments to certain persons.

3. Whenever such request shall indicate that proficiency in any of the specified optional subjects is of prime importance in the position to be filled the Commission may certify the names of the three persons in the eligible list having the highest standing (not being below the minimum of seventy) on such optional subject. The Commission shall have power to order a new or special examination whenever there are no persons on the eligible list sufficiently qualified in such optional subjects, or whenever an appointing officer shall apprise the Commission that any special qualifications are required for the position vacant. All positions filled by selections based on optional or special subjects will be specially noted in the published gazette of appointments, and in the official register of qualifications and schemes for examination as being special positions in respect of such qualifications.

4. In the selection from the persons whose names are certified as above by the Commission, the appointing or employing officer, upon his written requisition therefor, will be furnished with the application and examination papers of all the persons so certified, and in the exercise of his responsible power of selection he may summon personally before him the certified persons for such verbal inquiries as he may deem proper. All papers furnished upon requisition as above must be returned to the Commission with the notice of selection.

RULE 18.

Whenever physical qualifications are of prime importance in the proper discharge of duties in any position, applicants must pass a physical examination and be certified as qualified in such respect before record on the proper eligible list for selection for such position, or before certification by the Commission as qualified for such selection.

RULE 19.

1. No person on any register shall be certified more than three times to the same officer, except upon request of such officer; nor shall any one remain eligible more than one year on any register.

2. Upon satisfactory evidence produced to the Commission that any person whose name is on any eligible list is, by reason of his character, habits or past reputation, unfit for admission to the Civil Service, the name of such person shall be formally stricken from such eligible list.

3. No person who has entered upon any examination for a position in Schedule B or C shall be admitted, within one year from the date thereof to a new examination for the same grade or subdivision.

RULE 20.

Schedule C shall include the following sections:

CLASS 1.

Clerks in State prisons.

CLASS 2.

All persons of special qualifications (except those employed in the department of public works, the salt works, prisons, reformatories, asylums and other charitable and corrective institutions), including—Directors or curators of museums; geologists, botanists and entomologists and their respective assistants; librarians; and their assistants; sanitary experts; inspector of quarantine hospitals; medical superintendent of emigrants; health officers.

CLASS 3.

Subdivision I.

Court criers and attendants; court and other marshals; stenographers of courts; excise inspectors.

CLASS 4.

Subdivision I.

Superintendent of repairs.

Third Grade — Resident engineers.

Fourth Grade — Division engineers.

CLASS 5.

On the Onondaga salt works.

Subdivision I.

First Grade — Engineers (except the chief engineer), overseers of pumps and supervisors of aqueducts and reservoirs.

Second Grade — Chief engineer.

Subdivision II.

First Grade — Assistant inspectors, of salt or of barrels.

CLASS 6.

In the prisons and reformatories.

Subdivision I.

Wardens and agents of prisons; superintendents of reformatories.

Subdivision II.

Chaplains; principal matrons.

CLASS 7.

In asylums, hospitals and under the commissioners of emigration.

Subdivision I.

Superintendents of insane asylums.

Subdivision II.

Superintendents of asylums other than those for the insane.

Subdivision III.

Assistant physicians and pathologists in insane asylums in the lowest grade in each asylum.

Subdivision IV.

Physicians other than those in insane asylums.

Subdivision V.

Stewards of asylums, matrons of asylums.

RULE 21.

The positions in Schedule C may be filled by the appointing officer in his discretion in respect to the manner of examination. The discretion of the officer in such cases shall be limited as follows: (1) he may select from the three persons graded highest as the result of an open competitive examination; or (2) he may name to the Commission three or more persons for competitive examination, and appoint the one graded highest in such examination; or (3) he may appoint or employ any person named by him who upon a non-competitive examination shall be duly certified by the Commission as qualified to discharge the duties of the position.

RULE 22.

Competitive examinations for positions in Schedule C will be subject to the same general provisions as prescribed in Rules 8 to 18, both inclusive. If the competition be an open one, the public notice thereof shall denote the special qualifications in which competitors shall be examined. Before admission to a limited competition, the nominees must file with the Commission the certificates required by Rule 8.

RULE 23.

1. Upon the non-competitive examination into the qualifications of a person named to the Commission for a position in this schedule, the Commission will give a certificate to such person only when satisfied:

1st. That he is within the limits of age prescribed for the position or employment to which he has been named;

2d. That he is properly certified as free from any physical defect or disease which would be likely to interfere with the proper discharge of his duties;

3d. That his character is such as to qualify him for such position or employment; and

4th. That he possesses the requisite knowledge and ability to enter on the discharge of his official duties.

2. An officer, naming to the Commission a person for examination will at the same time transmit his certificate that after due inquiry he is satisfied that the character and habits of the person named fit him for the Civil Service, and will append to the certificate such formal vouchers or credentials as to character as he may desire to have considered or put on file. In the determination of character or habits of the nominee, the certificate thereof by the nominating officer will be considered as essential.

RULE 24.

In determining the limits of age and the subjects and scope of the examination into the qualifications for each position as defined in the fourth clause of the preceding rule, the head of the department, office or institution where such position is to be filled, shall be consulted by the Commission, or where the position is common to several offices of institutions, the several heads thereof shall be so consulted, and the regulations finally adopted for each position shall be published in the annual reports of the Commission. Differences arising under this rule between the heads of departments, offices and institutions and the Commission shall be reported to the governor, whose decisions in such cases shall be final and conclusive.

RULE 25.

Whenever a vacancy in this schedule in any department, office or institution is to be filled, the officer having the authority to fill the same shall notify the Commission which of the three methods in his discretion under Rule 21, he selects, and if the choice be by an open competition, the Commission shall proceed as for an examination under Schedule B, but if the choice be by a limited competition or by the appointment of a person to be duly certified by the Commission as qualified, the officer aforesaid shall name in such notification the person or persons to be examined, and the Commission shall thereupon instruct the proper board of examiners, and shall notify the person or persons so named, of the time, place and special regulations, for the examination; and the chief examiner shall supervise the preparation of proper questions and other inquiries to test the qualifications of such person or persons.

RULE 26.

The examiners for positions in Schedules C and D will be selected in the same manner, and subject to the same rules and regulations, as the examiners provided for in Rule 13.

Regular boards of examiners may be authorized to conduct examinations of persons duly cited to appear before them for positions in

any schedule. Whenever the peculiar duties devolved upon any position or class of positions may so require, special examiners will be designated and commissioned. All examiners for the Civil Service will promptly report to the Commission any violation of the provisions of the fifth section of the Civil Service Act.

RULE 27.

Schedule D shall include the following positions, viz. :

CLASS 3.

Subdivision III.

Keepers and janitors of public buildings, arsenals, bureaus, etc.; watchmen, firemen, porters and portresses in public buildings at Albany.

Subdivision IV.

All persons engaged in expert mechanical duties in public buildings or arsenals.

CLASS 4.

All persons employed in the department of public works not otherwise classified.

Subdivision IV.

First Grade — All those receiving an annual compensation of less than \$500.

Second Grade — All those receiving an annual compensation of \$500 or more.

CLASS 5.

Subdivision III.

All persons employed in the Onondaga Salt Works not otherwise classified.

CLASS 6.

In the prisons and reformatories.

Subdivision IV.

All persons employed as expert mechanics in prisons and reformatories.

Subdivision VI.

All persons employed not otherwise classified and excepting laborers.

First Grade — Such persons receiving an annual compensation of less than \$500.

Second Grade — Such persons receiving an annual salary of \$500 or more.

CLASS 7.

In asylums and other similar institutions, and by the commissioners of emigration.

Subdivision VI.

Engineers and expert mechanics and tradesmen.

Subdivision VIII.

First Grade — Attendants, nurses and orderlies.

Subdivision IX.

All other persons employed in asylums and by the commissioners of emigration not otherwise classified.

First Grade— All such persons receiving an annual compensation of less than \$500.

Second Grade— All such persons receiving an annual compensation of \$500 or more.

RULE 28.

The positions in Schedule D must be filled by such persons as upon proper non-competitive examination shall be certified as qualified to discharge the duties of such position by an examiner or examiners selected or appointed for that purpose by the Commission. The head of any office, department or institution, in which there may be a vacancy or vacancies in any position or positions in this schedule, may name for examination a person for each vacancy. The Commission may provide by special regulation, that in any institution where a number of persons are employed in the same grade, the employing officer may name for examination more than one person, in order that there may be a list of qualified persons from which to make an immediate selection in case of vacancy. Such nominations may be made to the Commission, or to an examiner or board of examiners as the Commission may prescribe by regulations.

RULE 29.

Examinations for positions in Schedule D shall be in all the four classes of qualifications defined in Rule 23, and their scope and details shall be determined in the manner directed in Rule 24. The examiner or examiners will be instructed by the Commission in general or special regulations as to the standard, scope and methods of examination, the methods of certification and the character of the records and reports to be made.

RULE 30.

Schedule E shall include the following positions:

CLASS I.**Subdivision 1.**

All clerks and other persons of whatever designation rendering services similar to those of clerks in any branch of the State service.

Fourth Grade— Clerks and like employes receiving an annual compensation of \$1,500 or more, but less than \$1,800.

Fifth Grade— Clerks and like employes receiving an annual compensation of \$1,800 or more, but less than \$2,000.

Sixth Grade— Clerks and like employes receiving an annual compensation of \$2,000 or more, but less than \$2,500.

Seventh Grade— Clerks and like employes receiving an annual compensation of \$2,500 or more.

CLASS 5.

Persons employed in the Onondaga Salt Works.

Subdivision II.

Second Grade — Receivers and inspectors of salt or of barrels.

Third Grade — Chief inspector of salt and chief inspector of barrels.

CLASS 6.

Persons employed in prisons and reformatories.

Subdivision III.

Second Grade — Keepers in prisons or reformatories receiving an annual compensation of \$900 or less.

Third Grade — Keepers of prisons or reformatories receiving an annual compensation greater than \$900 except the principal keepers.

Fourth Grade — Principal keepers.

Subdivision V.

Second Grade — Teachers receiving an annual compensation of \$500 or more, but less than \$1,000.

Third Grade — Teachers receiving an annual compensation of \$1,000 or more.

CLASS 7.

Persons employed in asylums and other similar institutions and by the commissioners of emigration.

Subdivision III.

All assistant physicians and pathologists in insane asylums except those in the lowest grade.

Subdivision VII.

Second Grade — Teachers receiving an annual compensation of \$500 or more.

Subdivision VIII.

Second Grade — Supervisors of asylums and wards.

RULE 31.

The positions in Schedule E shall be filled, when vacant, by the promotion of those in the service in the lower grades of the same subdivision in the department, office or institution in which the vacancy or vacancies may occur. Promotions shall be made, subject to the provisions of these rules, by the officer or officers having the power of appointment. If, in the judgment of such officer or officers, there be none found in the lower grades fit to perform the duties in such vacant positions, in that case, and in no other, the positions may be filled in the same manner as is prescribed by these rules for filling the positions in the lowest grade of the same subdivision and class. Promotions shall be made by successive grades; in case of vacancy in any position in this schedule, it shall be filled by a selection from the next inferior grade, if there be any person in such grade fit for promotion, and if there be no such person, then the promotion shall be made by selection from the next inferior grade, and so on until all the inferior grades are exhausted, and no person therein found fit, when the position shall be filled by appointment as above provided.

RULE 32.

Promotion will, in all cases, be based upon the positive merit of

the person promoted, and upon his superior qualifications as shown by his previous service. There shall be kept in every department, office and institution proper comparative records of the efficiency, punctuality, attention and general good conduct of all persons employed therein. No person in the service when these rules take effect can be promoted without passing an examination under the rules, of the same character as would an applicant for appointment to a similar position in the service. Examinations for promotion shall be based upon the actual work of the persons named therefor, as exhibited in the records of the office where they have been employed, and upon the certificate of their immediate official superiors, that their efficiency and conduct during their past service has been in all respects satisfactory and entitles them to favorable consideration.

RULE 33.

No recommendation of any person for promotion shall be entertained or received unless made in the regular course of duty by his immediate official superiors, and the presentation of any recommendation other than that of such superiors will be considered an unwarrantable interference with the public service, and the person so recommended may be required to show, before being certified for promotion that such recommendation was not made by his request or connivance.

RULE 34.

No temporary appointment or employment shall be made of any one not eligible for permanent appointment or employment, except that in the prisons, reformatories and asylums, temporary substitutes may be appointed without examination, for not exceeding thirty days, in cases of disability by reason of sickness or otherwise, but such temporary appointment can be made only once; and every temporary appointment under this rule must be reported to the Commission within five days, with the reason for the same.

RULE 35.

No person shall be appointed to any position in the Civil Service unless he is a citizen of the State and has been a resident thereof for at least one year previous to the date of his application or nomination. But this restriction shall not apply to the following positions in Schedule D, to-wit: The first grade of subdivision 4 of class 4; subdivision 3 of class 5; the first grade of subdivision 6 of class 6, and the first grade of subdivision 8, and the first grade of subdivision 9 of class 7. Any other exceptions from such restriction made by special regulation of the Commission shall be reported by it to the Legislature with the reasons therefor.

RULE 36.

In the selection, nomination or appointment of persons to fill posi-

tions in Schedules B, C and D, or promotion of persons to positions in Schedule E, no regard shall be paid to the partisan political opinions, affiliation or action of any person so selected, nominated, appointed or promoted.

RULE 37.

No transfer or promotion shall be made from a position in a subdivision in any schedule to a position in another subdivision in that schedule, or to one in any other schedule except by virtue of the examination and certification prescribed under these rules for admission to such last-named subdivision. Transfer without examination may be made from a position in one department, office or institution to a similar position in another department, office or institution upon the mutual consent of the heads of the respective departments, offices or institutions.

RULE 38.

Any application for a position in the Civil Service, made in contravention of the provisions of the ninth or thirteenth section of the Civil Service Act, must be rejected.

RULE 39.

No question in any examination or proceeding, by or under the Commission or examiners, shall call for the expression or disclosure of any partisan political opinion or affiliation of any person whatever, nor shall any discrimination be made by reason thereof; and the Commission and its examiners shall discountenance all disclosure before either of them, of such partisan opinion or affiliation by or concerning any applicants for examination, or by or concerning any person on any register awaiting appointment or employment.

RULE 40.

Every original appointment or employment in the Civil Service shall be for a probationary term of three months, at the end of which time, if the conduct and capacity of the person appointed or employed shall have been found satisfactory the probationer shall be absolutely appointed or employed, but otherwise his employment shall cease.

Every officer under whom any probationer shall serve during any part of such probation shall carefully observe the quality and value of the service rendered by such probationer, and shall report in writing, to the proper appointing officer, the facts observed by him, showing the character and qualifications of such probationer and of the service performed by him; and such reports shall be preserved on file.

RULE 41.

Every false statement knowingly made by any person in his appli-

cation for examination, and every connivance by him at any false statement made in any certificate which may accompany his application, or any willful complicity by him in any fraud to improve his standing upon examination, shall be regarded as good cause for removal or discharge of such person during his probation.

RULE 42.

If for any sufficient reason it shall be impracticable to supply the names of persons who have passed a competitive examination in due season for any appointment or employment in any position in Schedule B, a provisional appointment may be made of a person who has passed a non-competitive examination under the direction and regulation of the Commission; but the next report shall give the reason for such resort to non-competitive examination.

RULE 43.

1. All persons having the power of appointment to or employment in any position in the Civil Service must give notice in writing to the Commission of the name and place of residence of any person selected for appointment or employment in any position, of the rejection of any such person after probation, and of the transfers, promotions, resignations and removals, discharge or death of all persons serving under them, with the dates thereof.

2. Any officer who appoints, employs or promotes a person to or in a position in the Civil Service, the compensation for which is paid from the State treasury, or the account for which is subject to audit by the Comptroller, shall officially notify the Comptroller of such appointment, employment or promotion before certifying or rendering any account for the services of such person. Where the payment for the services in any position in the Civil Service is not payable from the State treasury nor subject to audit by the Comptroller, the notification as above of any appointment, employment or promotion to or in such position, shall be duly made to the fiscal officer empowered by law to pay the account for such services.

RULE 44.

Persons who have been honorably discharged from service in the army or navy of the United States, in the late war, shall be preferred for appointments to positions in the Civil Service over other persons of equal standing as ascertained under these rules, and the person thus preferred shall not be disqualified from holding any position in the Civil Service, on account of his age nor by reason of any physical disability, provided such disability does not render him incompetent to perform the duties of the position applied for.

RULE 45.

Subject only to the qualifications required to be ascertained in accordance with these rules, the power of appointment and the re-

sponsibility of selection are in all cases in the appointing officer. The power to remove (existing by law) on the part of any officer is not impaired by any thing contained in these rules.

RULE 46.

The Commission will cause to be published at such regular periods as it may deem proper, a gazette of all appointments, promotions, resignations, removals and other changes in the Civil Service, and in case of appointment may publish the names of the persons certifying the good character of the appointee.

RULE 47.

The Commission will make appropriate regulations for carrying these rules into effect, and may prescribe blank forms for all applications, certificates, records and returns required under the rules or regulations made in pursuance thereof.

STATE OF NEW YORK, }
Office of Secretary of State, } ss.:

I have compared the preceding with the original Rules for the Civil Service on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original Rules.

Given under my hand and seal of office of the Secretary of State, at the city of Albany, this 8th day of July, in the year one thousand eight hundred and eighty-four.

JOSEPH B. CARR,
Secretary of State.

GENERAL REGULATIONS OF THE NEW YORK CIVIL SERVICE COMMISSION.

THE CHIEF EXAMINER.

1. The chief examiner shall, so far as practicable, attend the examinations held by the several boards of examiners for positions in Schedules B and C.

He shall take care to secure accuracy, uniformity and justice in the proceedings of all examiners and boards of examiners under the rules and regulations, and such proceedings and all papers appertaining thereto shall at all times be open to him. He shall also from time to time inspect the proceedings and papers connected with examinations for the Civil Service of cities held pursuant to the eighth section of the Civil Service Act, and shall make report of such inspections to the Commission.

2. He shall prepare and submit to the Commission proper schemes for examinations, and forms for blanks and records.

He shall take care that the rules and regulations are complied with and shall bring any case of their infraction or of injustice or irregularity observed by him to the attention of the Commission. It shall be his duty, from time to time, to confer with the heads of departments, offices and institutions in the State service, concerning the regularity, sufficiency and convenience of the examinations for the service under them. He shall perform such other appropriate duties as may be specified in these regulations, or otherwise assigned to him by the Commission.

THE SECRETARY.

3. The secretary shall keep the minutes of the proceedings of the Commission, and have charge of and be responsible for the safe-keeping of the books, records, papers and other property in its office. He shall make the proper certification of those eligible for appointment or employment in positions in Schedules B and C. He shall generally conduct the correspondence of the Commission and perform such other appropriate duties as it may assign to him.

THE STENOGRAPHER.

4. The stenographer shall perform such appropriate duties as may be assigned to him by the Commission, or under its direction, by the chief examiner and secretary.

EXAMINERS.

5. Regular boards of examiners will consist of three members of whom shall act as secretary, and two of whom may conduct examination in the necessary absence of the third. The secretary shall keep a complete record of the proceedings of the board, all the examinations held by it, in such form as the Commission prescribe.

6. The chief examiner shall, subject to the Commission authority for holding examinations for positions in Schedules C, and shall prepare questions and supervise other preliminary arrangements for such examinations.

7. The boards of examiners will conduct the examination estimate and mark the standing of the persons competing, on non-competitive examination shall estimate the qualifications person examined, and in both cases shall transmit all the papers their report to the Commission.

8. Whenever the special qualifications required for a position of an expert or professional character, the Commission will, the examining board such advice and assistance from competent sources as may be expedient and available.

9. Boards of examiners for positions in Schedule D shall employ such persons as are named to them in writing by any officer authorized to employ persons in the positions in that schedule, and only certify such as satisfy the qualifications for such positions prescribed by the rules and regulations. They shall report to the Commission the names of persons examined by them with other pertinent information on forms furnished for that purpose, and will on file the minutes of their proceedings, with all papers connected therewith, which shall at all times be subject to the inspection Commission and its agents.

10. Special boards will be selected and special regulations examinations will be issued by the Commission in such cases as deem expedient.

11. No examiner or person serving under the Commission attempt to influence the selection, nomination or appointment person for the Civil Service.

12. Care must be taken by examiners to preserve order and decorum at examinations and to prevent such visitors as they may by conversation or otherwise to obstruct or distract those being examined.

13. Examiners must not disclose for public information, without consent of those examined, more than the general results of examinations, without the details of answers given.

14. Any person after receiving official notification of his status as ascertained by a competitive examination, may in person or by a duly authorized agent, inspect in the presence of the chief examiner or the secretary of the Commission, his examination papers and markings thereon.

15. Complaints which show any injustice or unfairness on the part of any examiner or examining board, or by any one acting under the Commission, will be considered by the Commission, which reserves the right to revise the marking and grading on the papers, or order a new examination, or otherwise act as substantial justice in the premises may require.

16. For the purposes of examinations, examiners are authorized by the last clause of the third section of the Civil Service Act, to request the use of suitable rooms in public buildings and the lighting and the heating of the same. In all cases the requisition for such accommodation should be in writing, reciting the provision of law above referred to and denoting the amount of room required, and should be addressed to the State, county, city, town or village officer having custody of the public building. School rooms are generally those best adapted for examinations.

17. Accounts of examiners (who are not otherwise in the civil service) for services and for reimbursement for necessary expenditures, should be rendered in the forms prescribed and sent to the Commission for approval before payment.

APPLICATIONS FOR POSITIONS.

18. Applications for admission to competitive examinations for positions in Schedule B will be directed to the "Civil Service Commission, Albany, N. Y." Blank forms for such applications and for the requisite certificates will be furnished upon request, which should specify the position in the service sought by the applicant. All applications for positions in Schedules A, C and D must be made to the head of the department, office or institution wherein the position is sought.

19. The Commission cannot advise persons as to vacancies in the service, nor furnish any information as to the duties, salaries, course of promotion, or other conditions of positions, except such as may be found in printed regulations. No advice can be given as to the course of preparation that applicants should follow, nor can specimens of the examination papers be furnished.

20. All application papers and accompanying certificates will remain on file in the office of the Commission, and under no circumstances or conditions will the originals be returned to the applicant.

EXAMINATIONS.

I. Competitive.

21. Applicants will be admitted to examination upon the production of the official notification to appear for that purpose. Each applicant will receive a number, which will be indorsed upon his notification when produced, and the notifications so indorsed shall be sealed in an envelope; each applicant will sign his examination papers with his number, omitting his name, and the envelope shall

not be opened until all the examination papers have been received and the markings and gradings made.

22. All examinations shall be in writing, except such as refer to physical qualities or expertness.

23. The sheets of questions will be numbered and will be given out in the order of their numbers, each after the first being given only when the competitor has returned to the examiners the last sheet given to him. In general, no examination shall extend beyond five hours without intermission; and no questions given out at any session, to any candidate, can be allowed to be answered at another session. Each applicant must complete his examination on the obligatory subjects, before taking up any of the optional subjects.

24. Each examiner will exercise all due diligence to secure fairness and prevent all collusion and fraud in the examinations.

25. The time allowed for completing the examination will be announced before the first paper is given out. For the obligatory subjects the examination should be confined to a single day, but the examiners may extend such time in special cases of emergency.

Marking.

26. The examination papers shall be reviewed by each examiner separately, and, in any case of disagreement, the average of the markings made on any question or paper by all shall be the final marking on such question or paper subject to the regulation as to revision.

27. The papers of all the competitors in each subject should be examined, compared and marked before the papers in another subject are taken up.

28. The marking of each question or subject shall be made on a scale of 100, which maximum shall represent accuracy or the highest possible attainment; and 0 shall represent absolute ignorance. Handwriting will be judged by its legibility, uniform and correct formation of letters and ease of execution. Upon a comparison of the handwriting of all the competitors, the best and worst should be first agreed upon, and the two extremes of the scale thus fixed; the others should be marked relatively to them. In writing from dictation or copying from manuscript, the omission, repetition or substitution of words, the erasures, blots and other evidences of carelessness, will proportionately to their numbers reduce the marking below 100. Spelling will be marked with reference to the ratio the misspelt words bear to the whole number of words dictated. Making abstracts or summaries of documents, and letter-writing will be marked as in handwriting, by agreeing upon the best and worst examples, and having marked them, then proportionately marking the others.

In each of the other subjects, each question shall be marked on the scale of 100, and the sum of such markings divided by the number of questions in that subject shall be the competitor's standing on such subject.

Grading.

29. The absolute or average general standing of each competitor will then be made up in form as follows, in accordance with the respective weight accorded to each subject by the regulations, thus:

EXAMINATION OF

SUBJECTS.	Weight given to subject.	Standing on subjects.	Product of weight and standing.
1. Writing from dictation.....	2	80	160
2. Handwriting	3	75	225
3. Spelling.....	1	78	78
4. Arithmetic	2	92	184
5. Reporting in writing from memory.....	2	88	176
Total product, .....	.....	.....	823
Divide by sum of weights or.....	10	.....	.....
General average standing .....	.....	.....	82.3

OR EXAMINATION OF

SUBJECTS.	Weight given to subject.	Standing on subjects.	Product of weight and standing.
1. Writing from dictation.....	3	96	288
2. Copying from manuscript	2	97	194
3. Handwriting	4	85	340
4. Spelling.....	3	88	264
5. Arithmetic	4	93	372
6. Geography and history.....	1	80	80
7. Constitutional questions.....	1	63	63
8. Making a summary	2	72	144
Total product .....	.....	.....	1,745
Divide by sum of weights.....	20	.....	.....
General average standing .....	.....	.....	87.25
OPTIONAL SUBJECTS.			
Book-keeping .....	.....	.....	80
Stenography .....	.....	.....	92

It will be observed that the standing on each subject is multiplied by the weight given that subject and the product placed in the third column, and the sum of these products divided by the sum of the weights gives the general average standing.

If, in the marking, it is found that the standing of a competitor on any subject falls below fifty, the further marking of the papers of such competitor may be dropped (Rule 15), and such fact recorded on the face of the paper in red ink.

30. The grading of the several competitors being completed, their names will be enrolled in the order of their excellence, as determined by such examination, upon a register of eligible persons in form as prescribed by the Commission.

31. Every paper in any examination not formally certified by the examiners will be signed with his initials in ink by each examiner who has reviewed and marked it.

32. Priority of date in examination will give no advantage in position on the eligible list. The names of the three persons highest in general average standing on the list for any grade will be certified for selection without regard to dates of examination, and subject only to the preferences of competitors on record for certain departments or offices, or to the certificate of the appointing officer, that an optional subject is of prime importance.

Non-competitive.

33. *Schedule C.* The boards of examiners before whom shall appear any person named for a position in Schedule C, subject to a non-competitive examination, will report to the Commission the facts regarding such person furnished to, or ascertained by, them upon the first three points as required by Rule 23. Upon the fourth point as required in said rule, they will examine the person so appearing in the several subjects prescribed by regulations in accordance with Rule 24. Such examination will be in writing, and the standing on each subject will be marked in the manner herein directed for competitive examinations.

The grading of such person, together with the examination papers and the report on the other points of inquiry, shall be transmitted to the Commission, as soon after the examination as practicable.

34. *Schedule D.* The boards of examiners for positions in Schedule D shall take evidence of the qualifications of persons properly appearing before them, as the same are defined in Rule 29, and regulations pursuant thereto. So far as may be practicable such examinations shall be in writing. If the board is satisfied that any person so appearing is duly qualified to discharge the duties of the position for which named, a certificate of qualification will be granted by the board in such form as the Commission may prescribe. Officers having the authority to employ persons in the positions included in Schedule D may directly name persons to any such board for examination. Quarterly reports on the first days of January, April, July and October in every year will be made by such boards to the Commission, giving names of all persons examined, the positions for which named, and whether or not certified as qualified. Intermediate reports of a similar nature will be made when specially required.

For Promotion.

35. Examiners will carefully inspect the work performed during the previous year by the persons named for promotion as regards its

accuracy and neatness, and should personally question them concerning their office work and its purposes, in order to ascertain if they have a general and intelligent knowledge of the business in the department where they are employed. No part of the examination need be by written answers to written questions, but the examiners may require the persons examined to give a written description of the work done by them and its relation to the duties of others.

General.

36. As soon as practicable after an examination the papers of the candidates will be marked, and their standings ascertained and communicated to them by the secretary of the Commission by mail. Prior to that time no inquiries addressed either to the examiners or the Commission will be answered. No letters explanatory of errors presumed to have been made in an examination will receive any attention.

37. The Commission cannot undertake to answer inquiries relating to cases which are not officially before it for decision, nor can it decide, except in cases of actual candidates on its registers, questions respecting the application of the rules and regulations.

38. Particular answers cannot be given to inquiries which are answered expressly or by implication in published regulations and similar documents.

39. The schemes of qualifications and subjects of examination of the same for positions in Schedules C and D will be published from time to time for general information.

In regard to many such positions, the nature and extent of such examinations will not be determined until after a vacancy in the position occurs.

No information can, therefore, be given in regard to such positions other than is published as above mentioned.

CLASSIFICATION OF THE CIVIL SERVICE.

[Approved by the Governor on September 3, 1888.]

The letters A, B, C, D and E, in brackets, indicate the schedule under the rules, in which the class, subdivision or grade is included.

CLASS 1.

All assistants and deputies of executive and administrative officers, and all clerks and other persons of whatever designation rendering services similar to those of clerks in any branch of the State service.

Subdivision I.

First Grade. [B.] — Clerks and like employes receiving an annual compensation of less than \$1,000.

Second Grade. [B.] — Clerks and like employes receiving an annual compensation of \$1,000 or more, but less than \$1,200.

Third Grade. [B.] — Clerks and like employes receiving an annual compensation of \$1,200 or more, but less than \$1,500.

Fourth Grade. [E.] — Clerks and like employes receiving an annual compensation of \$1,500 or more, but less than \$1,800.

Fifth Grade. [E.] — Clerks and like employes receiving an annual compensation of \$1,800 or more, but less than \$2,000.

Sixth Grade. [E.] — Clerks and like employes receiving an annual compensation of \$2,000 or more, but less than \$2,500.

Seventh Grade. [E.] — Clerks and like employes receiving an annual compensation of \$2,500 or more.

Subdivision II. [A.]

Deputies and assistants of principal officers or heads of departments ; the private secretary of the governor ; the clerk and reporter of the court of appeals ; the secretaries of State boards and commissions (but not assistant secretaries, they being rated as clerks) ; the chief examiner of the Civil Service ; treasurers of asylums ; game and fish protectors ; superintendent of public buildings.

CLASS 2, [C.]

All persons of special qualifications (except those employed in the department of public works, the salt works, prisons, reformatories, asylums and other charitable and corrective institutions), including directors or curators of museums ; geologists, botanists and entomologists and their respective assistants ; librarians and their assistants ; civil engineers and surveyors ; chemists ; sanitary experts ; principals, professors and teachers in normal schools ; inspector of quarantine hospitals ; medical superintendent of emigrants ; health officers.

CLASS 3.

All persons engaged in duties, other than those of clerks, in the courts and public offices and buildings at Albany and the State arsenals, except as laborers, and not included in the preceding classes.

Subdivision I. [C.]

Court criers and attendants; court and other marshals; stenographers in courts; excise inspectors.

Subdivision II. [C.]

Superintendents and assistant superintendents in charge of public buildings under the general superintendent.

Subdivision III. [B. and D.]

Interpreters in courts; keepers and janitors of public buildings, arsenals, bureaus, etc.; office messengers; orderlies in public buildings; watchmen; firemen; porters and portresses.

Subdivision IV. [D.]

Steam engineers and all other persons engaged in expert mechanical duties in public buildings or arsenals.

CLASS 4.

All persons employed in the department of public works other than the assistant superintendents, collectors of statistics and clerks (who are included in Class 1), and excepting laborers.

Subdivision I. [C.]

Superintendents of repairs.

Subdivision II. [B.]

Inspectors of boats and cargoes.

Subdivision III. [C.]

First Grade — Rodmen and levelers.

Second Grade — Assistant engineers below the rank of resident.

Third Grade — Resident engineers.

Fourth Grade — Division engineers.

Subdivision IV. [D.]

All others employed in said department not otherwise classified.

First Grade — All those receiving an annual compensation less than \$500.

Second Grade — All those receiving an annual compensation of \$500 or more.

CLASS 5.

All persons employed in the Onondaga salt works, except the deputy superintendent (Class I).

Subdivision I. [C.]

First Grade — Engineers, except the chief engineer, overseers of pumps and supervisors of aqueducts and reservoirs.

Second Grade — Chief engineer.

Subdivision II.

First Grade. [C.] — Assistant inspectors of salt or of barrels.

Second Grade. [E.]—Receivers and inspectors of salt or of barrels.

Third Grade. [E.]—Chief inspector of salt and chief inspector of barrels.

Subdivision III. [D.]

All others employed and not otherwise classified.

CLASS 6.

All persons employed in prisons and reformatories, except those included in Class I. [C.]

Subdivision I. [C.]

Wardens and agents of prisons; superintendents of reformatories.

Subdivision II. [C.]

Physicians; chaplains; principal matrons.

Subdivision III.

First Grade. [B.]—Guards in prisons.

Second Grade. [E.]—Keepers in prisons receiving an annual compensation of \$900 or less.

Third Grade. [E.]—Keepers of prisons receiving an annual compensation greater than \$900, except the principal keepers.

Fourth Grade. [E.]—Principal keepers.

Subdivision IV. [D.]

Steam engineers and others employed as expert mechanics in prisons and reformatories.

Subdivision V.

First Grade. [B.]—Teachers in reformatories receiving an annual compensation of less than \$500.

Second Grade. [E.]—Teachers receiving an annual compensation of \$500 or more, but less than \$1,000.

Third Grade. [E.]—Teachers receiving an annual compensation of \$1,000 or more.

Subdivision VI. [D.]

All other persons employed in prisons and reformatories, except laborers.

First Grade—Such persons receiving an annual compensation of less than \$500.

Second Grade—Such persons receiving an annual compensation of \$500 or more.

CLASS 7.

All persons employed in asylums for the insane, idiots, the blind and deaf and dumb, and in similar institutions, and by the commissioners of emigration, except those included in Class I and laborers.

Subdivision I. [C.]

Superintendents of insane asylums.

Subdivision II. [C.]

Superintendents of asylums other than those for the insane.

Subdivision III. [C.]

Assistant physicians and pathologists in insane asylums.

Subdivision IV. [C.]

Physicians other than those in insane asylums.

Subdivision V. [C.]

Stewards of asylums.

Subdivision VI. [D.]

Engineers and expert mechanics and tradesmen.

Subdivision VII.

First Grade. [B.] — Teachers receiving an annual compensation of less than \$500.

Second Grade. [E.] — Teachers receiving an annual compensation of \$500 or more.

Subdivision VIII.

First Grade. [D.] — Attendants, nurses and orderlies.

Second Grade. [E.] — Supervisors of asylums and wards.

Subdivision IX. [D.]

All other persons employed in asylums and by the commissioners of emigration.

First Grade — All such persons receiving an annual compensation of less than \$500.

Second Grade — All such persons receiving an annual compensation of \$500 or more.

In the above classification the inclusion of any specified official in any class, subdivision or grade shall not apply to any person acting as or termed as a deputy or assistant of such official, nor to any person acting for or as such official in case of absence, vacancy in office or otherwise.

The term "deputy" or "assistant" is not recognized in this classification, unless such designation is authorized by law.

Where any person receives a compensation rated not by the year, but by the day, week or month, the classification of such person, when dependent upon compensation, will be based upon his or her equivalent annual compensation.

The classes indicate the several grand divisions of the service. The subdivisions are intended to mark the distinct kinds of qualification necessary in each class, and the grade in the subdivisions are designed as steps for advancement by formal promotion.

The omission in the above classification of any official designation or appellation of a position in the service will not exclude such position from the classification, as it will be comprised in the class to which it belongs by the general specification of such class.

REGISTER OF QUALIFICATIONS, SCHEMES FOR EX-
AMINATIONS AND LIMITS OF AGE.

SCHEDULE B.

Under the provisions of Civil Service Rule 14, the following schemes have been prepared for the several grades and subdivisions in Schedule B.

Clerkships, positions as collectors of canal statistics (Class 1, Subdivision I, Grades 1 and 2). Salaries less than \$1,200 per annum.

Clerkships, positions as inspectors of canal cargoes (Class 4, subdivision II.)
Age not less than 21 years, nor more than 50 years.*

<i>Obligatory Subjects.</i>		Relative weights.
1. Writing from dictation (about one page of foolscap)		3
2. Copying from manuscript (about one page).....		2
3. Handwriting		4
4. Spelling		2
5. Arithmetic (viz.: 4 examples in numeration ; 4 in addition ; 6 in fractions ; and 4 in reduction of weights and measures)		3
6. Geography (viz.: 4 questions regarding the State of New York, and 2 re- garding the United States).....		1
Total.....		15

Optional Subjects.

Expert penmanship.
Elements of book-keeping.
Special qualification for any department of the Civil Service specified by the applicant.

Clerkships and like positions (Class 1, Subdivision I, Grade 3). Salaries of \$1,200 per annum or more, but less than \$1,500.
Age not less than 21 years nor more than 50 years.*

<i>Obligatory Subjects.</i>		Relative weights.
1. Writing from dictation (about one page of foolscap)		3
2. Copying from manuscript (about one page)		2
3. Handwriting		4
4. Spelling		3
5. Arithmetic (1 example in addition ; 3 in fractions ; 2 in reduction ; 3 in proportion ; 4 in interest and discount).....		4
6. Geography and history (4 questions of each relative to New York, and 2 of each relative to the United States).....		1
7. Constitution (3 questions concerning that of New York ; and 2 that of the United States).....		1
8. Making a condensed summary of a document (not exceeding 6 folios).....		2
Total		20

* Limitation of age does not apply to persons honorably discharged from the military or naval service of the United States in the late war.

Optional Subjects.

Expert penmanship.
 English composition or letter writing.
 Book-keeping.
 Shorthand-writing.
 Type-writing.
 Foreign languages.
 Special qualification for any department of the Civil Service specified by the applicant.

N. B. About all the clerkships in the State departments at Albany are in this grade. Clerks admitted by the examination for the first and second grades cannot be subsequently promoted to the third grade unless able to pass the examination for that grade.

Office messengers and orderlies in public buildings (Class 3, part of Subdivision III).

Age not less than 21 years, nor more than 45 years.*

Guards in prisons (Class 6, Subdivision III, Grade 1).

Age not less than 25 years, nor more than 40 years.*

Obligatory Subjects.

	Relative weights.
1. Writing from dictation (about one page of foolscap).....	2
1. Handwriting	3
3. Spelling	1
4. Arithmetic (5 examples in numeration ; 4 in addition ; 2 in subtraction ; 2 in multiplication, and 3 in division)....	2
5. Writing down from memory the substance of matter orally communicated.	2
Total.....	10

N. B. — Candidates for the positions of office messenger or orderly must be in approved physical condition for active duties.

Applicants for position of prison guard, in addition to the other requirements specifically named in Rule 10, must furnish satisfactory vouchers that they are not of an irascible or passionate disposition and are of a kind and humane disposition. They must not be less than five feet nine inches in stature when unshod, and before being admitted to service must pass a physical examination by the prison physician.

Teachers in reformatories (Class VI, Subdivision V, Grade 1).

Teachers in asylums, etc. (Class VII, Subdivision VII, Grade 1).

[The schemes of examination for these positions have not yet been prepared and will probably be varied to meet the special requirements of the respective institutions, and so far as practicable and necessary will be based upon the examinations for "State certificates," under the direction of the Superintendent of the Department of Public Instruction.]

In addition to the obligatory subjects above given to clerkships, certain clerks employed by the commissioners of emigration are obliged to be conversant with the German language, and weight is given to proficiency in other modern European languages.

SCHEDULE C.

In positions in this schedule where the duties are professional, technical or expert, the nominees or candidates will be required to show what preliminary training to technical education they have undergone to qualify them for such situations before they can be admitted to examination.

I. Additional assistant engineer on canals. 1, Arithmetic ; 2, geometry ; 3, applied or practical geometry ; 4, plane trigonometry ; 5, mensuration ; 6, use of instruments ; 7, mechanics ; 8, practical construction.

II. Additional leveler on canals. 1, Arithmetic to evolution ; 2, plane trig-

* Limitation of age does not apply to persons honorably discharged from the service of the United States in the late war.

nometry ; 3, mensuration ; 4, use and adjustment of instruments; 5, tabulation of field notes ; 6, making profile draughts.

COURT OFFICERS AND CLERKS.

1. **Stenographers**— Candidates for positions as stenographers shall be subject to a general examination similar in character to that required in the case of clerks receiving an equal amount of salary and the following :

<i>Obligatory Subjects.</i>	<i>Relative weights.</i>
1. Accuracy in taking notes of spoken or dictated matter at the rate of at least 150 words per minute.....	5
2. Correctness in transcribing such notes, regard being had to spelling (3) and penmanship (3).....	6
3. Accuracy in the immediate rendering of spoken or dictated matter, which they shall be required to take down and read, back, aloud, immediately....	5
4. Arithmetic (fundamental rules, proportion, interest, and discount).....	2
5. Elementary history and geography of New York State and the United States.	1
6. Constitution of New York State and the United States.....	1
	<hr/> 20 <hr/>

OPTIONAL, FOREIGN LANGUAGES.

2. **Interpreters** — Applicants for positions as interpreters shall be subject to a general examination similar in character to that required in the case of clerks receiving an equal amount of salary. They shall be subject to a special examination with a view to ascertain their fitness for the position applied for (a) In speaking and writing fluently and grammatically two (2) languages other than English. (b) In the rudiments of the history and geography of the countries in whose languages they offer to be examined. Their examination shall cover the following:

<i>Obligatory Subjects.</i>	<i>Relative weights.</i>
1. Rendering into English (speaking) dictated or spoken matter in two (2) foreign languages (each 5).....	10
2. Write translation from same (2) foreign languages of printed matter or manuscript (not exceeding 6 folios).	6
3. Elementary history and geography of the foreign countries in whose languages the candidate offers to be examined... ..	4
	<hr/> 20 <hr/>

Optional Subjects — Any additional foreign language.

3. **Court attendants** — Will be examined same as messengers, orderlies, etc., as above.

4. **Employees whose functions are purely clerical** — Same as 1st and 2d class clerks above.

5. **Clerks whose functions are more or less judicial or discretionary** — candidates for the positions in this class shall be examined with a view to ascertain their knowledge of the jurisdiction of the court for a position in which they apply, and their knowledge of the practice of the law pertaining to the special duties which they may be called upon to perform.

<i>Obligatory Subjects.</i>	<i>Relative weights.</i>
1. The practice of the law relative to the particular duties which they may be required to perform.....	5
2. Questions relating to the jurisdiction of the court for a position in which they apply.....	3
3. Writing from dictation (about one page of foolscap).....	2
4. Copying from manuscript (about one page).....	2
5. Handwriting.....	3
6. Spelling.....	3

7. Arithmetic (fundamental rules, fractions, reduction, discount, interest and proportion).....	3
8. Geography and history (New York State and United States).....	1
9. Constitution	1
10. Making a condensed summary of a document (not exceeding six folios)....	2

25

Optional Subjects.

Expert penmanship, English composition or letter writing, book-keeping, short-hand writing, type writing, foreign languages, special qualifications for the department specified by the applicant.

INSTRUCTIONS TO EXAMINERS.

[The instructions and special regulations prepared for the examinations held at the State on April 24, 1884, being generally applicable to all competitive examinations for the State service, they are given below with few changes.]

In order that the proceedings at all places may be uniform, the following instructions are given for the guidance of those appointed by the Commission as examiners to conduct the competitive examinations for the State service.

1. All the necessary arrangements for the examination-room and its proper furniture should be completed several days prior to the date of examination. Reference is made to the last clause of section three of the Civil Service Act, wherein permission is granted to use certain public buildings. The desks should be arranged so that competitors cannot communicate with each other or copy each other's papers without observation. There should be at least two square feet of table for use of the examiners, and this should be placed so that supervision may be had of every desk. On the day prior to the examination each desk should be provided with ink, two pen-holders with pens and a blotting paper. It will be of great advantage to secure the services of a competent and trustworthy person to receive the candidates at the door of the examination-room and who might also assist the examiners during the entire day, particularly in distributing the papers to candidates. The attention of all concerned is respectfully invited to the provisions of section 1 of the Civil Service Act, which makes penal certain offenses.

2. The blank questions in sealed envelopes will be sent by express from the office of the Commission so as to reach each place of examination at least twenty-four hours before the date of examination and should be deposited with seals intact, in some secure place. An accompanying package will contain the stationery envelopes, each inclosing a desk card.

3. On the day of examination the chosen assistant should appear early at the door of the examination-room with the packages containing the envelopes and desk-cards. It will be convenient to have a small table on which to place these cards. Each notified applicant must present to the attendant as a warrant for his appearance an official notification signed by the Secretary of the Commission. No one should be admitted who does not present such notification. The attendant will give the applicant one of the envelopes, from which the applicant will take the card inclosed, and indorsing

notification the number on the card will put the notification in the envelope, seal it, and return it to the attendant. The applicant retaining the card will then be admitted to the examination-room as an accepted candidate. No applicant, presenting himself after 10 o'clock, A. M., should be admitted, since no matter what may be the cause of delay, his admission after that hour would derange the proceedings.

4. At 10:05 A. M., the examiners should announce the beginning of proceedings, and should request the candidates to separate themselves into three groups: One to contain all candidates for positions as orderly or messenger in public buildings and prison guards; the second to contain all candidates for the first and second grade clerkships; and the third to contain all candidates for third grade clerkships. For convenience, each group should then be seated by itself, as the examination for each is distinct.*

5. All being properly seated and order restored, one of the examiners should ask if all the candidates have carefully read the regulations for examination sent to them with their notification, and also if all are provided with ink and pens. In the meantime the other examiners should break the seals and open the package of examination papers, which will be found in four parcels, one containing questions, etc., for third grade clerkships, printed on *white* paper; one for second and third grade clerkships, on *blue* paper; and one for orderlies, prison guards, etc., on *yellow* paper; and the fourth marked "optional," containing questions on optional subjects, and which parcels should not then be opened. The papers from the several parcels should be kept distinct on the table, and each color will be found to contain several sets of questions, numbered from one upward, in each series.

6. The first paper from each series, viz.: "writing from dictation," will be distributed to each candidate in the respective groups. In the white parcel, on a large card, will be found printed the matter to be dictated (which is to be read to and written down by all the candidates). After notice, one of the examiners will begin to read the matter to be dictated slowly and one phrase at a time, so that it may be fairly copied, and to avoid, if possible, a repetition which is apt to confuse the writers. Great care should be taken to read deliberately, with distinct utterance, until the whole has been read. Then for review and proper punctuation, the whole should be again read with ordinary rapidity.

7. The exercise in dictation is the only one in which all the groups join in unison, and after its completion all the papers should be taken up. The second papers in each series should then be given out to the candidates in the respective groups, and thenceforward the successive papers in numerical order, but only one at a time. Each candidate, when he completes a paper, is to be fur-

*Of course grouping will be unnecessary when the examination is for a single grade only.

nished with the next one, without regard to the progress of others in the group. The completed papers are to be taken up before the next ones are given out. In distributing the second paper, viz.: "Copying from manuscript," to the two groups of candidates for clerkships, one of the lithographed drafts of letter will be given as the matter to be copied.

8. Only general explanations should be given to candidates, and these should be limited to methods of procedure. No information or aid in solving questions should be permitted from any source, and vigilance should be exercised to prevent the use of any book or manuscript for such purpose, or copying from the papers of another candidate. No candidate should be allowed to leave the room while engaged upon a paper. One examiner should always be present in the examining-room.

9. The examiners will preserve order and decorum, and no conversation or unusual noise by the candidates should be permitted. They should not allow any visitors admitted by them to distract the attention of the candidates. No such visitor should be admitted, except by invitation of the examiners, and not more than two at any one time. The natural nervousness of candidates under examination is apt to be increased by the consciousness that they are observed, or their work scrutinized by those not officially in charge, and great discretion should be exercised in the admission of visitors, who should not be permitted to inspect the answers in the presence of the candidates. Special care must be taken that nothing regarding the work of the candidates is procured for publication. The examiners hold all the papers in trust for the Commission.

10. If a candidate declines to complete all the papers and withdraws from the examination, he must deliver to the examiners his desk-card, on which the time of his withdrawal should be marked. Also as each candidate completes all the papers he will deliver his desk-card, on which the time of completion should be marked. All these desk-cards will be retained by the examiners.

11. Each candidate on leaving will inform the examiners what optional subjects, if any, he desires to be examined in, and they will name a time and place for him to appear for such purpose.

12. The time occupied in the examination on obligatory subjects must not exceed eight hours. If this space be reckoned from the distribution of the first paper (10:10 A. M.), with an allowance of twenty minutes for luncheon, the close of the examination would be at 6:30 P. M., or about sunset. (N. B. — The time as expressed herein for the beginning and close of proceedings is the exact or solar time, and not the standard railroad time, recently adopted.) Should there occur an accidental delay in opening proceedings, or their suspension through any unforeseen cause, the examiners, in accordance with the twenty-second General Regulation, will see that the full period of eight hours is allowed, but in no case should such allowance of eight hours be exceeded. Ten minutes before the time for closing the examination, notice of such closing should be given to the candidates, and at the close all papers, finished and unfinished, will be taken up.

OPTIONAL SUBJECTS.

13. While it is presumed that only a small number of candidates will desire to be examined on optional subjects, the interest of the public service will be subserved by giving full opportunity to all who desire such privilege. The examination on these subjects being comparatively brief, it may be held on the evening of the day of general examination or the next day and in a smaller room.

A special package of papers, for examination on such of the optional subjects as could be prepared in advance, will accompany the other papers. These are for "Elements of Book-keeping," "Book-keeping," "Foreign Languages," and "Stenography," and full directions are given at the head of each paper.

For the other subjects the following plans will be pursued :

Expert penmanship. This is an accomplishment of prime importance in some positions and of great value in all of them. The candidate will copy the paper for "Stenography," and may also exhibit his skill in pen-printing and other styles useful or ornamental in engrossing, copying, recording, preparing tabular statements, etc. The time occupied will be denoted on the papers by the examiners.

Type-writing. It is presumed that a type-writing machine is accessible at each place of examination. The candidate will be given a copy of these instructions and directed to copy from the first page the paragraphs marked 1 and 2 (that is from "all the necessary," etc., to "desk-card"). Only one trial is to be allowed, and the time occupied in type-writing will be written at the foot of the page, and signed by one of the examiners.

English composition or letter-writing. The examiners will select a subject for an essay or letter, writing the subject at the head of the sheet of foolscap paper. The candidate will then in their presence write the essay or letter, which should not exceed two pages in length. The time occupied should be recorded, and certified at the foot of the paper.

Special qualification for any department of the public service. The candidate will give in writing the details of the special experience or training which he claims would be valuable in the service. If such proficiency is capable of practical test, such as a facility in adding correctly and rapidly long columns of figures or in casting interest, or in making general averages, the representatives may test such qualifications and certify their estimate of the same to the Commission.

Care must be taken that all such papers are, for the purposes of identification, marked with the candidate's desk number, as on the papers for obligatory subjects.

MARKING AND GRADING.

In addition to the instruction given in General Regulations 26 to 32, special directions as to marking and grading will be given to examiners when deemed necessary by the Commission.

SPECIAL REGULATIONS FOR EXAMINATIONS.

CIVIL SERVICE COMMISSION,
ALBANY, *March 31, 1884.* }

As provided by Civil Service Rule 9, the following special regulations are issued for the guidance of applicants who may appear as candidates in the competitive examinations for the State Service.

1. Applicants must present themselves punctually at the times and places specified in their official notifications. No one will be admitted except upon the production of such notification signed by the Secretary of the Commission. Under no circumstances can any applicant be admitted after 10 o'clock, A. M.*

2. Before entering the examination-room each applicant will be presented with an envelope, from which he will take a card inscribed with a number, and he will retain this card and indorse plainly the same number on his notification and place the notification in the envelope, seal it and return it to the person in attendance, and will then be admitted as an accepted candidate. The number on the card is known as the "desk number," *and such number and the name of the city where the examination is held must be put at the top of every paper used by the candidate in the examination.* This number is necessary as a means of identifying the papers with the name of the candidate when the envelope is opened. *The name of the candidate must not appear on any examination paper.* The desk number is so important that the attention of each applicant is particularly directed to the necessity of a correct and plain indorsement of the number on the notification before it is put in the envelope and sealed.

3. The examination will be in charge of the examiners appointed by the Civil Service Commission, who will decide all matters and preserve order. They must be obeyed in all respects, and are authorized to expel any one guilty of unseemly or disrespectful conduct.

4. The proceedings will begin by the separation of the candidates into three groups — one of applicants for positions as orderlies and prison guards; one for first and second grade clerkships; and one for third grade clerkships. Each group will be seated by itself.

5. Candidates will be furnished with paper, pens and ink, but those who are accustomed to use any particular pen are advised to bring it with them. Pencils must not be used, and all the writing and figures must be in ink. In writing from dictation and copying from manuscript, stylographic pens must not be used.

* This is by exact or solar time and not standard railroad time.

6. The questions used in the examination are printed with sufficient space after each for an appropriate answer, and the answer must be written in that space. A single sheet of foolscap paper is given each candidate for experimental calculations, but in solving the arithmetical problems, the entire process must be given in the space provided. A simple answer, without such process, will not receive a maximum mark, even if correct. It is for the interest of the candidate that the full operation be thus shown, since the examiners may thus detect any errors occurring through inadvertence, which might otherwise be attributed to ignorance of methods.

7. No candidate can be allowed to leave the examination-room until he has completed or given up the paper on which he is engaged. No changes or corrections in papers can be made after they are given up to the examiners.

8. No conversation, disturbing noise or actions will be allowed. Whenever a candidate has completed a paper, and wishes the next one, or desires any explanation, he will hold up his hand, and one of the examiners or their attendant will visit his desk.

9. Candidates are warned not to bring with them for consultation any books or manuscripts; any use of such assistance, either in the examination-room or elsewhere during the examination, will be considered such a violation of the regulation as may lead to the rejection of the offender's papers.

10. The same penalty will be incurred by any candidate who copies from the papers of another or permits his own papers to be copied, or who receives or gives assistance of any kind, or who writes upon his papers any irrelevant or disrespectful remarks.

11. Candidates are recommended to bring their luncheons with them, and to eat them in the examination-room. For the convenience of those coming from a distance, it is desirable to complete the examination in a single day, and the time consumed in going out for a meal would seriously abridge a candidate's available time for work.

12. The time allowed for the obligatory examination is eight hours, with an additional allowance of twenty minutes for luncheon. This time cannot be extended, but the examiners will not include any general delay, interruption or suspension of the proceedings through accidental causes. In this connection candidates are advised as a precautionary measure to carefully study the schemes of examination, in order to make an approximate allowance of time for each subject. The eight hours is ample for the longest task, *i. e.*, the third grade clerkship scheme, *but candidates are often apt to waste so much time in reviewing and recasting their work, and generally without advantage*, that they are hurried in the later subjects, and so often do themselves an injustice which cannot be repaired.

Ten minutes before the time of closing, notice will be given, and at the expiration of that time all the papers, finished and unfinished, will be taken up.

13. In order that applicants may have a clear understanding of the scope of the examinations for the several positions open for competition, their attention is directed to the published schemes for examinations.* By a careful study of these each applicant can estimate the amount of time he can allow for the respective subjects and so not be hurried in any of them.

14. Finally, all candidates are advised that earnest and determined endeavor to honestly do the best, without worry or undue anxiety, will produce the highest possible result. The ordeal of these examinations, except in their necessary confinement, is not exacting or in any way difficult to those who have availed themselves of the free education the State proffers to all.

* See page

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BLANK FORMS.

Form No. 1 - a. — Application Paper.

NEW YORK CIVIL SERVICE COMMISSION.

DIRECTIONS.

1. All the statements in the application are to be made under oath.
2. Every false statement knowingly made by the applicant in this paper, or connived at by him in any certificate which may accompany the same, is good cause for removal during probation. All appointments are first made for the probationary term of three months.
3. The application paper must be filled by the applicant in his own handwriting.
4. Send application, properly filled out and the certificate signed, to the "New York Civil Service Commission, Albany, N. Y."
5. No recommendations or certificates besides those provided at the end of this blank will be received.
6. A failure to fill the blanks properly, or to send satisfactory certificates, will cause the application to be returned for correction, but no such opportunity will be given a second time. Applications which show that the applicant lacks the qualifications as to age, health, residence, etc., or that he is manifestly unfit for the service, will be rejected.
7. The receipt of the application, in proper form, will be acknowledged by the Commission.
8. The applicant will be notified of the first examination which may be deemed conveniently located for him to attend, after his application is received. He should give notice of any change in his post-office address.

APPLICATION.

Desiring to enter the Civil Service of the State of New York as a _____ in the _____ at _____, I make this application, and declare the following to be facts concerning myself, viz.:

- (1.) My full name is _____
- (2.) My post-office address is _____
- (3.) My legal residence is _____
- (4.) I am a citizen of the State of New York. (N. B. — If a naturalized citizen, give date of naturalization.) _____
- (5.) I have been a resident of the State of New York since _____
- (6.) My present occupation or business is _____
- (7.) To the best of my knowledge and belief I was born at _____ on the _____ day of _____ 18____, I am therefore _____ years of age.
- (8.) I believe and represent myself to be a person of good health, and without mental or physical incapacity or infirmity, of which I am aware, which in any way disqualifies me for a full discharge of official duty in the service which I seek to enter.
- (9.) My principal occupation and my residence during each of the last five calendar years were as follows:

Residence.

Occupation.

1879,
1880,
1881,
1882,
1883,

,
;
;
;
;
;

- (10.) Were you ever examined for the Civil Service? If so, where, when, and for what position?

(11.) Were you ever in the Civil Service? If so, state what service and the cause of your leaving it?

(12.) My education was received chiefly in (here state school, academy or college, and length of course).

(12.) I have the following qualifications or experience which would be useful in the public service.

(14.) If you were in the military or naval service of the United States in the late war, give name of organization or vessel to which attached, date of enlistment or commission, position or rank, date and cause of discharge from the service, and any physical disability incurred in the service.

(Signature of Applicant.)

STATE OF NEW YORK, COUNTY OF _____, ss.:

And on this _____ day of _____ 188____, said _____ having been duly sworn (or affirmed) before me, stated that to the best of his knowledge and belief the several statements in the foregoing application contained, whether in writing or print, are true.

(Signature of Officer.)

(Official Title.)

PHYSICIAN'S CERTIFICATE.

Given at _____, on _____, 188____.

I, _____, a practicing physician, resident in the above-named place, do hereby certify that I have examined the applicant _____ and believe him to be free from any physical defect or disease which would be likely to interfere in any respect with the proper discharge of his duties, should he be selected for the service of the State of New York.

(Signature of Physician.)

(N. B. — Whenever deemed expedient for the interests of the service, and particularly for positions other than clerks, an applicant who has proven himself as otherwise eligible for appointment will be liable to a physical examination by a physician in the service of the State, or acting on its behalf.)

CERTIFICATES OF CHARACTER.

Directions. — Not less than three nor more than five persons must vouch for the character of the applicant, and they must be citizens of good character and standing in the community where they and the applicant reside, and must have been personally acquainted with him for at least one year. Should the applicant receive an appointment, the names of such citizens may be publicly announced. Sections 9 and 13 of the Civil Service Act read as follows:

§ 9. No recommendation of any person who shall apply for office or place under the provisions of this act, which may be given by any Senator or Member of Assembly, or officer confirmed by the Senate, or judge of any court, except as to the character or residence of the applicant, shall be received or considered by any person concerned in making any examination or appointment under this act.

§ 13. No recommendation or question under the authority of this act shall relate to the political opinions or affiliations of any person whatever.

N. B. — The persons who sign the following vouchers are notified that they may be required by appointing officers to give over their own signatures further information concerning their knowledge of the applicant.

(*Voucher No. 1*). I (being more than twenty-five years of age, and not a kinsman of the applicant) have been a resident of _____ for _____ years past. I have been personally acquainted with _____ the applicant above, and I state upon my honor that I have read the application of said applicant, and believe each of the statements made therein to be true; and that I believe him to be of good moral character, of temperate and industrious habits, and in all respects fit for the service of the State of New York, and that I am willing this certificate shall be published for public information.

(Signature.) (P. O. Address.)

(Occupation.)

(Also four more vouchers like above.)

Form No. 1-b. — Application Paper.
NEW YORK CIVIL SERVICE COMMISSION.

DIRECTIONS.

- 1. All the statements in the application are to be made under oath.
- 2. Every false statement knowingly made by the applicant in this paper, or connived at by him in any certificate which may accompany the same, is good cause for removal during probation. All appointments are first made for the probation term of three months.
- 3. The application paper must be filled by the applicant in his own handwriting.
- 4. Send the application, properly filled out and the certificates signed, to the "New York Civil Service Commission, Albany, N. Y."
- 5. No recommendations or certificates besides those provided at the end of this blank will be received.
- 6. A failure to fill the blanks properly or to send satisfactory certificates will cause the application to be returned for correction, but no such opportunity will be given a second time. Applications which show that the applicant lacks the qualifications as to age, health, residence, etc., or that he is manifestly unfit for the service, will be rejected.
- 7. The receipt of the application, in proper form, will be acknowledged by the Commission.
- 8. The applicant will be notified of the first examination which may be deemed conveniently located for him to attend, after his application is received. He should give notice of any change in his post-office address.

APPLICATION.

Desiring to enter the Civil Service of the State of New York as a _____ in the _____ at _____, I make this application, and declare the following to be facts concerning myself, viz. :

- (1.) My full name is _____
- (2.) My post-office address is _____
- (3.) My legal residence is _____
- (4.) I am a citizen of the State of New York. (N. B. — If a naturalized citizen, give date of naturalization.) _____
- (5.) I have been a resident of the State of New York since _____
- (6.) My present occupation or business is _____
- (7.) To the best of my knowledge and belief I was born at _____ on the _____ day of _____ 18____. I am therefore _____ years of age.
- (8.) I believe and represent myself to be a person of good health, and without mental or physical incapacity or infirmity, of which I am aware, which in any way disqualifies me for a full discharge of official duty in the service which I seek to enter.
- (9.) My principal occupation and my residence during each of the last five calendar years were as follows :

<i>Residence.</i>	<i>Occupation.</i>
1879,	;
1880,	;
1881,	;
1882,	;
1883,	;

- (10.) State whether married or single? If married, give number of children?
- (11.) Were you ever in the Civil Service? If so, state what service and the causes of your leaving it?
- (12.) My education was received chiefly in (here state school, academy or college, and length of course).
- (13.) If you have had the superintendence or command of men, or other experience that would be useful as a guard or keeper in prisons, mention it?
- (14.) If you were in the military or naval service of the United States in the late war, give name of organization or vessel to which attached, date of enlistment or commission, position or rank, date and cause of discharge from the service, and any physical disability incurred in the service.

(Signature of Applicant.)

STATE OF NEW YORK, COUNTY OF , ss.:

And on this day of 188 , said having been duly sworn (or affirmed) before me, stated that to the best of his knowledge and belief the several statements in the foregoing application contained, whether in writing or print, are true.

(Signature of officer.)
(Official title.)

CERTIFICATES OF CHARACTER.

Directions. — Not less than three nor more than five persons must vouch for the character of the applicant, and they must be citizens of good character and standing in the community where they and the applicant reside, and must have been personally acquainted with him for at least one year. Should the applicant receive an appointment, the names of such citizens may be publicly announced. Sections 9 and 13 of the Civil Service Act read as follows:

§ 9. No recommendation of any person who shall apply for office or place under the provisions of this act, which may be given by any Senator or Member of Assembly, or officer confirmed by the Senate, or judge of any court, except as to the character or residence of the applicant, shall be received or considered by any person concerned in making any examination or appointment under this act.

§ 13. No recommendation or question under the authority of this act shall relate to the political opinions or affiliations of any person whatever.

N. B. — The persons who sign the following vouchers are notified that they may be required by appointing officers to give over their own signatures further information concerning their knowledge of the applicant.

VOUCHER No. 1.

I (being more than twenty-five years of age, and not a kinsman of the applicant) have been a resident of for years past. I have been personally acquainted with , the applicant above, for years, and I state, upon my honor that I have read the application of said applicant, and believe each of the statements made therein to be true, and that I believe him to be of good moral character, of temperate and industrious habits, not of an irascible or passionate disposition, but of a kind and humane disposition, and in all respects fit for service as a guard or keeper in the prisons of the State of New York, and that I am willing this certificate shall be published for public information.

(Signature.) (P. O. Address.)
(Occupation.)

(Also four more vouchers like the above.)

PHYSICAL CONDITION.

Applicants for the position of prison guard will not receive an appointment until they have successfully passed a physical examination by a prison physician. In order that an applicant may be reasonably satisfied that he will pass such a physical examination before incurring the trouble and expense of appearing before the Examining Board for inquiry into his education, he should submit himself to some competent physician at or near his residence, and request an examination and certificate.

As a suggestion to the physician making such preliminary examination, his attention is invited to the following inquiries, the answer to which should be affirmative, except the last, which should be negative.

1. Is the candidate of sound physical condition?
2. Is his respiration full and free?
3. Is his voice clear and distinct?
4. Is his sight good?
5. Is his hearing sharp and quick?
6. Is the action of his heart natural?
7. Is he free from nervous complaints?
8. Is he free from headaches and fits?
9. Is he free from rupture?

10. Is he free from varicose veins in the legs?
 11. Is he free from all internal complaints?
 12. Are there any circumstances connected with health or strength that can in your opinion tend to render the applicant unfit for prison service, as a guard or keeper? If so, please state them.

CERTIFICATE.

I, _____, a practicing physician, resident at _____, do hereby certify that I have examined _____, the above applicant, and having in view all and several the above questions, I do further certify that I find him physically* _____ for the prison service of the State of New York.

(Signature.)
 Dated at _____, this _____ day of _____, 188 _____.

Form 2. — Return of defective application for correction.

STATE OF NEW YORK:

CIVIL SERVICE COMMISSION, }
 ALBANY, _____, 188 _____.

SIR — Your application paper is herewith returned for correction, because it does not conform to the directions. The particulars referred to are indicated by pencil marks upon the margin.

Please perfect your application as required, and return it to this office. Under the rules a second opportunity for correction cannot be given.

Very respectfully yours,

Secretary.

CIVIL SERVICE RULE XI.

Defective applications will be suspended and applicants notified to amend the same, but no such notice will be given or opportunity granted a second time. Whenever the application shows that the applicant is not within the prescribed limits of age or otherwise not qualified under the rules and regulations, or is manifestly unfit for the service, the application will be rejected.

Form 3. — Acknowledgment of receipt of application.

Application
 No. _____.

STATE OF NEW YORK:

CIVIL SERVICE COMMISSION, }
 ALBANY, _____, 188 _____.

SIR — Your application for a position as a _____ in the _____ at _____, being in class _____, subdivision _____, grade _____, has been received and found to conform with the rules. Your name has, therefore, been placed on the proper register of persons entitled to notice of examination. Such notice will be sent to you by mail ten days previous to the first examination held after this date for the grade above named. The registration of an applicant as entitled to examination confers no other right, and your attention is called to the regulations below.

Very respectfully yours,

Secretary.

* Here add the words "fit" or "unfit" as the case may require, and at the end any further remarks deemed desirable.

CIVIL SERVICE REGULATIONS 19 AND 20.

19. The Commission cannot advise persons as to vacancies in the service, nor furnish any information as to the duties, salaries, course of promotion or other conditions of positions, except such as may be found in printed regulations. No advice can be given as to the course of preparation that applicants should follow, nor can specimens of the examination papers be furnished. 20. All application papers and accompanying certificates will remain on file in the office of the Commission, and under no circumstances or conditions will the originals be returned to the applicants.

Form 4. — Notice that application is rejected.

STATE OF NEW YORK:

CIVIL SERVICE COMMISSION, }
ALBANY, , 188 . }

SIR — I am directed by the Civil Service Commission to inform you that your application shows that you are not qualified for service in the position sought by you, viz.: in class , subdivision , grade , for the following reasons:

Your application is, therefore, rejected under the provisions of Rule XI, and cannot be again accepted until you are in all respects qualified.

Very respectfully yours,

Secretary.

CIVIL SERVICE RULE 11.

Defective applications will be suspended and applicants notified to amend the same, but no such notice will be given or opportunity granted a second time. Whenever the application shows that the applicant is not within the prescribed limits of age or otherwise not qualified under the rules and regulations, or is manifestly unfit for the service, the application will be rejected.

Form 5. — Notice to appear for examination.

STATE OF NEW YORK:

CIVIL SERVICE COMMISSION, }
ALBANY, , 188 . }

SIR — You are hereby notified that a competitive examination, under the rules and regulations of the Civil Service Commission, of applicants for admission to positions in class , subdivision , grade, , will be held at city of , on the day of , 188 , beginning at o'clock A. M. You must be present at the hour named or it will not be practical to examine you.

A failure to attend, unless satisfactorily shown to have been occasioned by sickness or other sufficient cause, will debar you from further notice of examination under your present application.

This notification must be presented to the examiners as your authority to appear.

Very respectfully,

Secretary

Form 6a. — Result of examination of individual.
EXAMINATION NO. .

Result of examination of .

SUBJECT.		Relative weight given to subject.	Standing on subject.	Product of standing and weight.
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
Sum of weights				
Total product				
General average standing				

Optional Subjects.			Standing.
11.			
12.			
13.			
14.			

Form 7. — Result of examination of all appearing.

Examin. Board.
No.

RESULT OF EXAMINATION NO.

SCHEDULE B.
{ Class
Subdiv'n
Grade

CIVIL SERVICE — STATE OF NEW YORK.

To the Civil Service Commission :

At an examination held at on the day of , 188 , there appeared applicants, and the following is a true statement of the standing of such applicants as marked by us :
Dated at , 188 ..

Examiners.

NAMES.	General average standing.	STANDINGS ON OPTIONAL SUBJECTS.						Remarks.
		11.	12.	13.	14.	15.	16.	

Form 8. — Notice of failure to pass.**STATE OF NEW YORK :**

CIVIL SERVICE COMMISSION, }
ALBANY, , 188 . }

SIR — I have to inform you that at the examination held at on the day of , 188 , for positions in class , subdivision , grade you failed to pass the minimum of in and therefore your name cannot be placed on the register of those eligible for appointment.

Very respectfully yours,

Secretary.

CIVIL SERVICE RULE 15.

No person whose standing on any obligatory subject is less than 50, or whose ascertained average standing on all the obligatory subjects is less than 70, will be entered upon the eligible list.

Form 9. — Notice of eligibility.

Exam. Board.
No. 6.

Class.
Subdivision.
Grade.

STATE OF NEW YORK :

CIVIL SERVICE COMMISSION, }
ALBANY, , 188 . }

SIR — At the examination held at on the day of , 188 , you passed above the minimum of seventy, and your name has therefore been placed upon the proper register of applicants eligible for appointment. Whenever your name is reached in the order of its general standing, it will be certified with two others to such heads of departments, offices and institutions as give notice of vacancies in the grade for which you are eligible. Should you be selected for appointment you will be so advised by the appointing officer. Under these conditions your name will remain on the register for one year from the date of examination, and if not selected during that period it will be dropped from the register.

Your standing and extracts from the rules and regulations are given below.
Very respectfully,

Secretary.

Perfect standing, one hundred.
Your general average standing was
On optional subjects your standing was

EXTRACTS FROM RULES AND REGULATIONS.

RULE 18. Whenever physical qualifications are of prime importance in the proper discharge of duties in any position, applicants must pass a physical examination and be certified as qualified in such respect, before record on the proper eligible list for selection for such position, or before certification by the commission as qualified for such selection.

RULE 19. No person on any register shall be certified more than three times to the same officer, except upon request of such officer; nor shall any one remain eligible more than one year on any register. No person while remaining eligible on any register shall be admitted to a new examination for the same grade or subdivision.

RULE 40. Every original appointment or employment in the Civil Service shall be for the probationary term of three months, at the end of which time, if the conduct and capacity of the person appointed or employed have been found satisfactory, the probationer shall be absolutely appointed or employed, but otherwise his employment shall cease. * * *

REGULATION 32. Priority of date in examination will give no advantage in position on the eligible list. * * *

OFFICE OF _____, }
_____, 188 . }

Very respectfully,

OFFICE OF THE CIVIL SERVICE COMMISSION,
ALBANY, , 188 .

NAMES.	P. O. Address.	Standing.

Secretary.

OFFICE , }
 , 188 . }

Very respectfully,

* Indicate here if proficiency in an optional subject is of prime importance. *

Form 13. — Notice of appointment for probationary term.

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF
, 188 . }

To

SIR — This is to inform you that under the provisions of the Civil Service Rules, I have selected you for appointment to the position of _____ in this _____ for a probationary term of three months from the date when you begin service. Should your conduct and efficiency during such probationary term prove satisfactory, you will at its close receive a regular appointment, otherwise your employment will cease. The salary attached to such position is at the rate of \$ _____ per annum.

This conditional appointment does not preclude prompt discharge from service at any time during such probationary term, in case of misconduct or inefficiency.

A prompt reply is requested, stating whether this appointment is accepted, and giving the earliest date when you can present yourself for service.

Very respectfully,

Form 14. — Notice that probation has not been satisfactory.Class
Subdivision
Grade

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF
, 188 . }

SIR — I have to inform you that your _____ during your employment in this department for a probationary term of three months has not been found satisfactory, and that in accordance with the terms of your original appointment, as prescribed in the fortieth Civil Service Rule, your employment in this office will cease on the day of _____, 188 .

Very respectfully yours,

RULE 40.

Every original appointment or employment in the Civil Service shall be for a probationary term of three months, at the end of which time, if the conduct and capacity of the person appointed or employed shall have been found satisfactory, the probationer shall be absolutely appointed or employed, but otherwise his employment shall cease * * *

Form 15. — Notice of re-appointment after probation.Class
Subdivision
Grade.

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF
, 188 . }

SIR — Upon the report of the officer under whom you have immediately served in this department that your conduct and capacity as a _____, during the probationary term of three months, has been found satisfactory, you are hereby reappointed without term, as a clerk in this department, at an annual salary of \$ _____, beginning on the day of _____, 188 .

RULE 40.

Every original appointment or employment in the Civil Service shall be for a probationary term of three months, at the end of which time, if the conduct and capacity of the persons appointed or employed shall have been found satisfactory the probationer shall be absolutely appointed or employed, but otherwise his employment shall cease.

Every officer under whom any probationer shall serve during any part of his probation shall carefully observe the quality and value of the service rendered by such probationer, and shall report in writing to the proper appointing officer, the facts observed by him, showing the character and qualifications of such probationer and of the service performed by him; and such reports shall be preserved on file.

Form 16. — Requisition for papers by appointing officer.

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF
 , 188 . }

To the Secretary of the Civil Service Commission :

SIR — In accordance with the fourth paragraph of Rule 17, I hereby make requisition for the application and examination papers of and which will be treated as confidential and returned to your files within five days from receipt.

Form 17. — Circular letter from appointing officers to persons who have given recommendations.

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF
 , 188 . }

To

SIR — Appended to the application of for a position in the Civil Service as a , filed with the Civil Service Commission, is your general certificate of his good character and habits.

As his name is on the eligible list, I would respectfully request you to answer the following questions in writing after each, sign your name at the foot and return the paper to me at your earliest convenience.

Very respectfully yours,

How long have you known ?

How long has he resided in ?

Is he temperate, truthful and industrious?

Is his general reputation in the community good?

In your judgment are his health, character, associates and habits such as fit him for the Civil Service of the State of New York?

Would you hesitate on account of his capacity, condition of health, character, associates or habits to employ him in your own private business, had you occasion for such services as he desires to render the State?

Signed at , the day of , 188 .

Form 19. — Nomination for non-competitive examination.

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF
 , 188 . }

To , Secretary of the Civil Service Commission :

SIR — Under the provision of Civil Service Rule 25, I hereby name of for non-competitive examination for the position of in this , being in class , subdivision , grade .

I transmit herewith such testimonials of his qualifications, conformable to the rules, as I have in my possession and request (*)

Very respectfully,

* Here please state if an immediate examination is requested.

Form 20. — Report of non-competitive examination.Exam'g
board
No. }**REPORT OF EXAMINATION.**SCHEDULE C.
Class
Subdiv'n
Grade }**CIVIL SERVICE — STATE OF NEW YORK.**

, 188 .

To the Civil Service Commission :

We have the honor to report that in accordance with your directions and under the rules and regulations for the Civil Service, we have examined Mr. of and* him qualified to enter upon the discharge of official duties as The certificates and documents setting forth the details of such non-competitive examination are transmitted herewith.

We are very respectfully,

*Board of Examiners.***Form 21. — Certificate of qualification, non-competitive examination.****CERTIFICATE OF QUALIFICATION.**SCHEDULE C.
Class
Subdiv'n
Grade**CIVIL SERVICE — STATE OF NEW YORK.**

No. .

OFFICE OF THE CIVIL SERVICE COMMISSION, }
ALBANY, , 188 . }

This is to certify that by a non-competitive examination under the direction of the Commission, and in accordance with the rules and regulations for the Civil Service, Mr. of has been found qualified to enter upon the discharge of duties as a .

Secretary. ●**Form 25. — Request for and certificate of examination.**

SCHEDULE D.

CIVIL SERVICE — STATE OF NEW YORK.

OFFICE OF , 188 . }

To the Board of Examiners :

You are respectfully requested to examine for the position of in

SCHEDULE D.
Class
Subdiv'n
Grade**CIVIL SERVICE — STATE OF NEW YORK.***Board of Examiners No. .*

, 188 .

This is to certify that in accordance with the rules and regulations for the Civil Service has been examined and found qualified for the position of in

Board of Examiners.

N. B. — No certificate of those found not qualified is to be issued. Their rejection and cause for same must be recorded in the minutes of the proceedings.

* Enter here as may be required, the words "do not find" or "find."

Form 26.

STATE OF NEW YORK — CIVIL SERVICE.

Quarterly Report — Schedule D.

Report of persons examined for position in Schedule D, in the at
during the quarter ending , 188 .

Date of examination.	Name of person examined.	For what position.	Marking. ("Qualified" or "not qualified.")	Date of certificate.

Respectfully submitted,
To the Civil Service Commission,
Albany, N. Y.

Chairman of Ex. Board.

Form 30. — Reply to applicants other than for Schedule B.

STATE OF NEW YORK :

CIVIL SERVICE COMMISSION, {
ALBANY, , 188 . }

" SIR — I would respectfully inform you that the position mentioned in your letter of , is in class , subdivision , grade , and under the Civil Service Rules is comprised in Schedule . Applicants for position in that schedule cannot be received by the Commission.

Civil Service Regulation 18 provides that " All applications for positions in Schedules A, C and D must be made to the head of the department, office, or institution where the position is sought."

The inclosures in your letter are returned herewith.

Very respectfully yours,

Secretary.

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